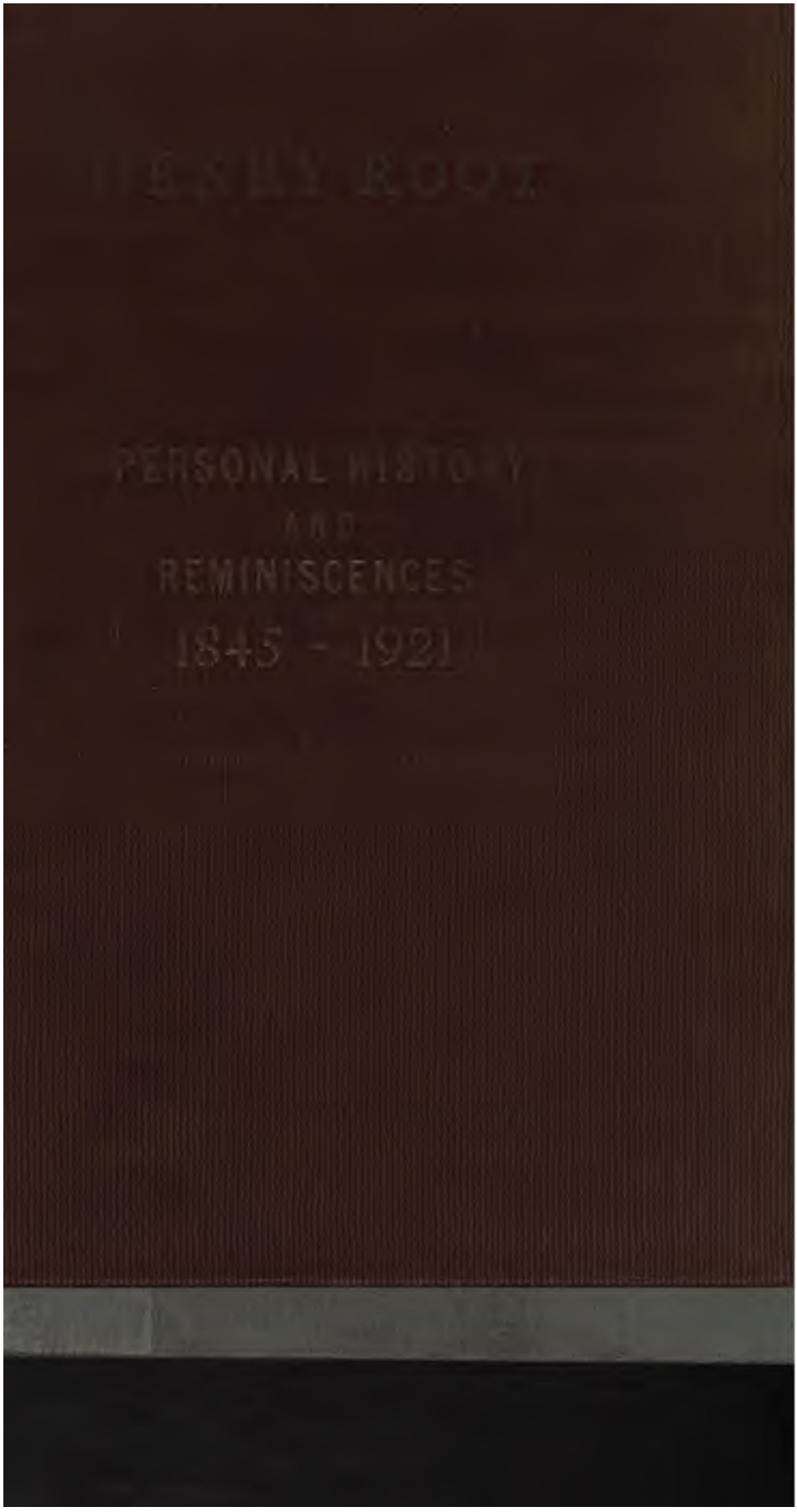
PERSONAL HISTORY
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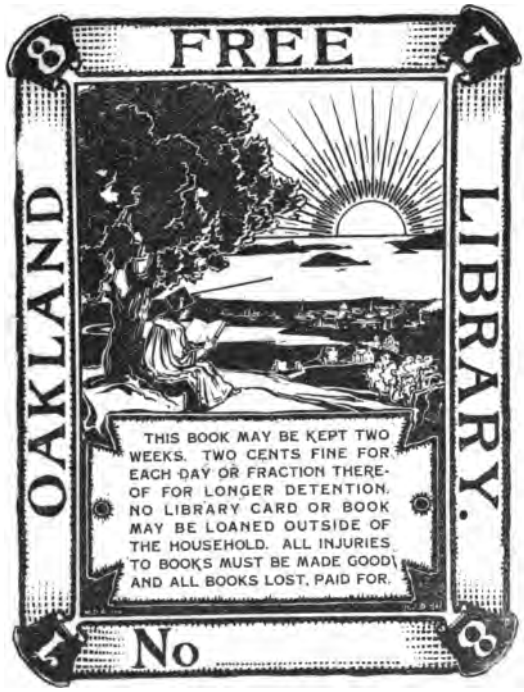
REMINISCENCES
1845 - 1921



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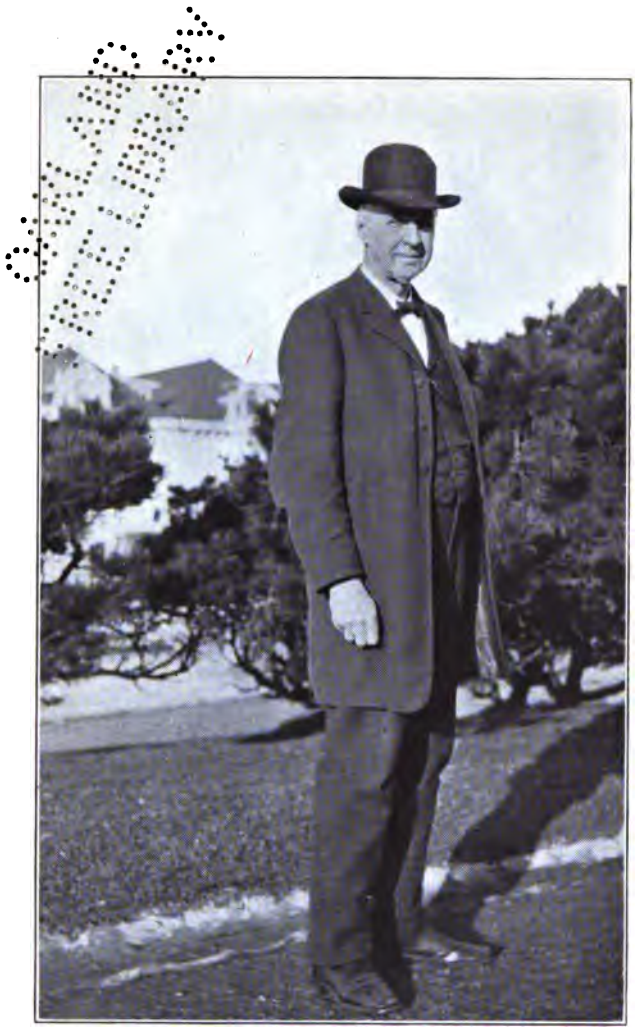

HENRY ROOT
San Francisco
1920

HENRY ROOT

Surveyor, Engineer and Inventor

Personal History

and

Reminiscences

with

Personal Opinions on Contemporary Events

1845 - 1921

Printed for Private Circulation
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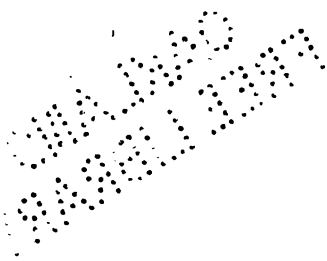
1921



Personal History and Reminiscences

Chapter 1.

VERMONT HISTORY AND THE START OF WORK IN SACRAMENTO.

I, Henry Root, of San Francisco, California, was born on a farm in the town of Williston, Chittenden County, Vermont, November 27, 1845. My father was Zimri Root and my mother Amelia, née Atwater.

The title to this farm was derived from the New Hampshire grants. The foundation of title to land in the town of Williston, like other Vermont towns, is in grants made by the Royal Governors of New Hampshire (largely by Benning Wentworth), under King George the Second of England, to share holding companies, or groups of proprietors, generally reserving to the King the ownership of the pine timber on the land suitable for masts and spars for his majesty's ships. Notwithstanding the separation of the country from the British dominion by the war of the Revolution that land was later stripped of its largest and finest pine timber which was exported through the port of Quebec to the English market.

Bennington was the first town granted and it took the first name of Governor Benning Wentworth. It was made memorable by the victory over the British forces

in the war of the Revolution. The grants of land in what is now the state of Vermont are to the westward of the Connecticut River and were made notwithstanding the fact that, while New York was still in possession of the Dutch, King Charles the Second of England had made a grant of that whole country extending eastward to the Connecticut River to his brother, James, Duke of York, afterwards King James the Second; but the great majority of the settlers of the country, known as the "Green Mountain boys," held some kind of title derived from the Royal Governor of New Hampshire and were jealous of and hostile to "Yorkers" as they called the officials around Albany.

My great-grandfather, Elisha Root of Montague, Hampshire County, Massachusetts, held the shares of stock reserved to Benning Wentworth in the grant to Willis and others of six miles square on the French or Onion, now the Winooski, River, now the town of Williston, Vermont. His father was Joseph Root who died at Montague, October 1, 1786, and his gravestone in the cemetery near the village there is well preserved.

Just before the year 1800 Elisha Root with his three sons, Arad, Chester and Elisha, went to Vermont to find the land to which he had title under the New Hampshire grant, and he was awarded lot No. 1 of the town as it had then been surveyed and divided in satisfaction of his claims for the shares derived from Benning Wentworth. The three sons remained and became citizens of Vermont; but the father returned to Massachusetts and died there in 1812. Arad, my grandfather, first built a log

house and later one of sawed lumber, afterward owned by my father where I was born. Through a long term of years up to the close of the American Revolution this country had been overrun by war parties of the claimants of the country. The river forming the northern boundary of Williston had been in early years the winter trail of French and Indian war parties travelling from Canada on the ice to attack the settlers of the frontier settlements of Massachusetts, New Hampshire and Connecticut.

In 1854 my father's family moved to Williston village for better school accommodations. On September 1, 1858, I entered the Williston Academy, a private school of which J. S. Cilley was principal and manager, where I continued until November, 1860. This was the last of my attendance at school but I studied at home between working times another year.

In the year 1862 I was at Daniel Patrick's house in Hinesburg, an adjoining town, studying surveying and working with him when he had outside jobs. He let me run the compass, an old fashioned sight-vane instrument. The next year I bought a compass and surveyor's chain and did a few little jobs myself; one for Chas. S. Seymour and one for my old friend Homer Beach (who was a pensioner of the war of 1812), both in Williston.

In April, 1864, together with several others including Lemuel T. Murray and wife, just married, I left Williston for California. Others in the party could not get tickets out of New York, but I sailed from there on the Vanderbilt steamer "Ariel," April 23, 1864, for Aspin-

wall, now Colon. We crossed the Isthmus on the Panama Railroad and sailed from Panama May 2, 1864, on the steamer "Golden City" of the Pacific Mail Steamship Company. Outside of Acapulco, Mexico, we were stopped by a shot from one of the French warships blockading the port, but they let us go in for coal. We reached San Francisco on the night of May 15, 1864, at about 11 o'clock p. m., docking at the foot of Folsom Street. It was dark so I took the first hotel bus I came to and went to the "Original House" on the south side of Sacramento Street below Kearny Street, just above the well known "What Cheer House."

At that time my sister, Mrs. Lewis H. Talcott, was living on a milk ranch beyond the Mission out the San José road and up Berkshire Street to about where 32nd Street would cross the Rock Creek Valley. The place where they lived then was called the Gardner Ranch and the land was rented from the owner of the San Miguel Rancho. Lewis sold milk in the city and came around once a day to Wilson's saloon at the corner of Kearny and Clay Streets so I found him easily and went home with him on the milk wagon. I stayed there with my sister, until July 5, 1864, when I went to Sacramento to look for a job in the surveying business. My brother-in-law did not think I could find such a job in San Francisco and thought I had better take anything I could find, but I was after a surveying job. My sister had friends in and around Sacramento, so I asked her to go up there on a visit and inquire about surveying jobs. She made a visit to Silas Whitcomb's ranch on the

Sacramento River, about twelve miles below Sacramento. Mrs. Whitcomb said if I would go there they would do what they could to find a job for me. Mrs. Whitcomb, later Mrs. Wright, was formerly Carrie A. Murray of Williston. I went to Sacramento on the steamer "Chrysopolis" leaving from Broadway wharf. Through Mr. and Mrs. Whitcomb I procured an introduction to Mr. Prentice who was in charge of the County Surveyor's Office in Sacramento and I went to work for him, the rate of pay being left open until he knew what I could do. I engaged board at the Western Hotel on K Street, then kept by Mr. Thayer. William Land, who later built and was the owner of the Land Hotel, was then runner for the Western Hotel.

At that time, Gilbert W. Colby was the elected County Surveyor of Sacramento County and was also State Locating Agent for State lands. Mr. Colby had a large ranch and country store at Rock Creek, north of Chico in Butte County, Mr. Prentice attending to all his official business in Sacramento as deputy. There was a landing on Colby's Ranch, for the Red Bluff boats, called Colby's Landing and also a swing ferry across the Sacramento River.

The winter of 1864-1865 Mr. Colby took the job of sectionizing the township next north of the Bidwell grant called "Rancho Arroyo Chico" from the United States Land Office and asked me to go up there and do the work, said that he would find the necessary help for me up there at his ranch and store; so I took the transit, chain and rod from the office, and went by the stern-

wheel Red Bluff boat and landed at Colby's Ranch. Stayed there several weeks doing the work, the first thing being to retrace the northerly line of the Chico grant. On my return trip drove to Sacramento with Colby's horse and buggy via Yolo County, stayed at the Ohio House all night and then continued on via Cacheville and Woodland.

The County Surveyor's office which had been located upstairs in Clay's building on Fourth Street, corner of the alley, was moved during the year to the south end of the St. George building on the lower floor on Fourth Street. On the 4th of March, 1866, Mr. Colby's term of office expired, A. G. Winn having been elected to that office on the Democratic ticket, so my regular employment there ended; but Mr. Winn asked me to continue to use his office if I had anything to do, which I did up to May 2, 1866.

Chapter 2.

WORK ON THE MOUNTAINS AND PLAINS FOR THE CENTRAL PACIFIC RAILROAD.

On May 2, 1866, I commenced work for Mr. S. S. Montague, Acting Chief Engineer of the Central Pacific Railroad, being assigned to help J. R. Wilkinson around Sacramento and up the line as far as Rocklin. The line was then in operation to Colfax but was soon extended to Secrettown. On July 5, 1866, I was sent to Polley's Station at Crystal Lake on the Dutch Flat and Donner Lake wagon road to report to L. M. Clement, there to work with McCloud's party on construction work just starting there. I went by train to Secrettown and by stage from there paying $6.20 stage fare and stopping at Dutch Flat for dinner. I lived in a log cabin on the east side of Crystal Lake from this time until December 23, 1866, when I moved with McCloud's party to Camp 41 to go into winter quarters to give lines and grades in Tunnels 3, 4 and 5 and to work on estimates.

The summer of 1866, to me, was a strenuous one. S. S. Montague, Acting Chief Engineer of the Central Pacific Railroad, the original California corporation, was in control of all engineering work. His office was upstairs at 54 K Street, Sacramento, but he went wherever necessary to supervise the business under his control. A. Steiner was Chief Draftsman and J. R. Wilkinson, also a fine draftsman, was in charge of the local work within easy reach of Sacramento. L. M. Clem-

ent was Resident Engineer of the work from Alta to Truckee, with A. R. Guppy under him as Locating Engineer; on the subdivisions were George Johnson at Emigrant Gap, McCloud at Crystal Lake and Guppy at the Summit, as soon as the location there was finished. During the summer, Stevenson, who had been on the Hoosac Tunnel work for the State of Massachusetts, was sent by Mr. Montague to report to Clement and he took a piece of work between McCloud and Tincker's at Summit Valley. Charles Cadwalader, Phelps, Buck and several others were on the work lower down, reporting direct to Mr. Montague. John F. Kidder, later the principal owner of the Grass Valley-Nevada City Railroad, had run lines down the Truckee River for Mr. Montague. Butler Ives was one of the principal topographical engineers of the company and out-ranked any of Mr. Montague's men he came in contact with at that time, with the possible exception of Clement and Cadwalader.

The entire construction work was supposed to be done by contract in the name of Charles Crocker & Company and the engineering department was required to make monthly estimates as the work progressed and to make a final when completed. The culverts and other masonry work were sub-let by Charles Crocker or his representative, J. H. Strobridge, to stone masons like Quinn and Scobie, but the engineer on the division had to lay out and approve the work. In the spring of 1868 the Contract and Finance Company succeeded Charles Crocker & Company as the general contractor for all the work:

with Wm. E. Brown as Secretary and Chief of Accounting, J. H. Strobridge, General Superintendent, and Arthur Brown in charge of all carpenter and bridge work except the masonry. During the summer of 1866, Mr. Strobridge, I think, resided at Alta most of the time, but moved to the Summit later and had his headquarters there during the construction of the Summit Tunnel, or No. 6, as it was called. That was during the winter of 1866-1867. Clement also had his office there during that time and John R. Gilliss was in charge of the office. A. R. Guppy did the outside engineering work.

The sinking of the working shaft near the middle of Tunnel No. 6 at the Summit was commenced August 27, 1866. The old locomotive "Sacramento," converted into a hoisting engine, was used in sinking that shaft. Mr. Strobridge had assistants who travelled over the work who were known as "Riding Bosses." Mike Stanton, Frank Frates and Mr. Spaulding were on portions of the work I had to furnish with lines and grades during the summer of 1866. More powder was used than was economical, but time was the essential of all operations so there was a good reason for the excessive use of powder by the rock foreman, as it did not cost them anything. But the frequent and heavy blasting made it very difficult to keep the work to correct lines and grades and when the rock cuts were completed there were a large number of fills uncompleted. The calculation was that the material removed from a cut was to be used to make the nearest fill, but that was impossible after it had been blown away by heavy blasts so it was necessary to use

a large number of horses and carts for the long haul required to get material to complete the fills as the track-laying gang was approaching.

Some of the events I find recorded in my remembrancer of the year 1866 are as follows:

Thursday, September 10th. Went with J. R. Wilkinson up to the new depot grounds at Cisco to help him locate a section corner of the U. S. Land Survey. Wilkinson came from Sacramento to our camp on the 10th on the stage, and will return in a day or two.

September 16th. J. R. Scupham and George Strong are here, getting ready to start out on the plains to get some information for Mr. Montague. On the 17th I saw them saddle the pack mules for the trip, taking with them, among other things, a barometer.

September 20th. Put in the finishing stakes through Yuba Pass.

September 24th. At Butte Cañon, the masonry foundations are in and the carpenters are ready to commence raising bents.

October 7th. Helped McCloud lay off some town lots above the railroad line at Cisco. We got our dinner at Madden's Hotel.

October 29th. Mr. Montague came here tonight with L. M. Clement and Charles Cadwalader. By Mr. Montague's orders Robert Finley and Henry Pitcher leave us for the Summit tomorrow morning.

November 8th. I went to the lower end of our division and commenced putting points on the center line

for the track layers who are approaching. The operated end of the track, is now at Alta.

November 14th. George Johnson came to our camp to get our notes so as to connect his line to them. The track layers are now on his division.

November 17th. The end of the track is now Station 4619.

November 21st. Track at Miller's Bluffs tonight.

November 27th. I, Henry Root, am 21 years old today. The track is across the Butte Cañon trestle.

November 29th. The first train reached Cisco today.

December 18th. It has been storming for several days and the new laid track is broken in several places so the trains from Sacramento stop at Alta again. Conductor Wood's train is blockaded at Emigrant Gap.

December 24th. Abandoned the engineers' camp at Crystal Lake and moved to Camp 41. It has stormed most of the time for the past three weeks and the new railroad is badly washed out. Some bents of the Butte Cañon trestle are out.

During the years 1866 and 1867, my position was that of assistant to McCloud on construction. I had known him in Sacramento before either of us entered the employ of the Central Pacific Company under Mr. Montague. His usefulness was so impaired by the drink habit that, at times, I had all the work to do, both transit and level, but he was an experienced railroad engineer while my previous experience had been as a surveyor. After the track had been extended over our division, late in 1867, I went to Guppy's camp on the

Summit but the new track was soon covered by snow and the operating end remained at Cisco or below. Finally we abandoned that camp and crawled out on the snow in a rain storm.

During the summer of 1867 an isolated section of the railroad had been constructed from Truckee to Camp 24 near the Nevada line and the rails and a little rolling stock hauled by team over the wagon road for it.

The spring of 1868 brought some changes in management. Charles Cadwalader was put in charge of all the engineers on construction by Mr. Montague. I had orders to report to him at the end of the Truckee track at Camp 24. I went over the Summit to Truckee on the stage and from there on, in a box car. Mr. Strobridge and Mr. Sisson who furnished Chinamen and their supplies were in the same car. I slept that night in a shed at Camp 24, the weather being very cold, and the next day went to Hunter's Station laying out culverts and cross sectioning. In a few days moved on to Reno and then to the sheep ranch at the head of the cañon below the Truckee meadows where we remained several weeks, sleeping in a large wagon and laying out culverts and cross sectioning. I had only two men, Armstrong and Cooke, and got my orders from Cadwalader. I was soon sent ahead across the desert and camped at Lovelocks, near the sink of Humboldt, then on to the first crossing of the Humboldt River where I laid out a temporary line and bridge of 50 feet span to be used till the permanent bridge was built so as not to delay the track. This was about June 1, 1868.

The entire summer of 1868 was passed on construction work up the Humboldt, moving frequently as the work was light and the track laying was now being rushed. The gap over the Summit to Truckee was closed in June, so that rails and other building materials could be shipped from Sacramento to the end of the track without rehandling. Mr. Minkler who had been a "Riding Boss" was put in charge at the moving end of the track and R. H. Pratt was in charge of team transportation. This rush continued through 1868 and the early part of 1869, until on the 10th of May, 1869, the tracks of the Central and Union Pacific Railroads met and were connected on Promontory Mountain and the ceremony of driving the golden spike took place. Soon after general traffic, both freight and passenger, of the first transcontinental railroad was commenced from Omaha to Sacramento.

Chapter 3.

CENTRAL AND SOUTHERN PACIFIC RAILROAD WORK IN OAKLAND, SAN FRANCISCO AND ELSEWHERE.

In December, 1868, while I was camped at Bishop Creek, I was ordered to pack up and go to the end of the track at North Fork and go to Sacramento. From there Mr. Montague sent me as transit man with A. R. Guppy to Oakland. In the party with me were Lewis Tashiera, Jack Wade, John Harding, Billy Morgan and others and the whole party went to the "Hotel de France" to board, on First Street near Broadway in Oakland.

In August, 1868, Governor Stanford and his associates had purchased from A. A. Cohen, a majority of the stock of the Oakland Railroad and Ferry Company operating a ferry from the foot of Pacific Street, San Francisco, to the pile wharf, some 3000 feet from the shore, through Seventh Street, Oakland to San Antonio or Brooklyn; also, a Creek Ferry, landing at the foot of Broadway, Oakland, with a terminus at La Rue's wharf, San Antonio.

In August, 1869, Cohen and others sold a majority of the stock of the San Francisco-Alameda & Haywards Railroad to the same parties. Mr. Cohen remained as president of said corporation and also received a salary from Stanford and associates as their attorney. At that time, December, 1868, there was no connection in car transportation between Oakland and Alameda and no bridge across the Estuary. The County Seat of Alameda

County was at San Leandro. The easiest way of getting from Oakland to San Leandro or Haywards was by train and ferry to San Francisco; there take the Alameda ferry to Alameda Point at the foot of Pacific Avenue; there take the train through Pacific and Railroad avenues (now called Lincoln Avenue), crossing San Leandro Creek about a thousand feet westerly from where Fourteenth Street now is, and making an S curve into and out of Estudillo Avenue and along what is now Haywards Avenue to the town of Haywards, the terminus. The other alternative route from Oakland to Haywards was to take the train at Seventh Street and Broadway to Brooklyn, then walk along Twelfth Street to Park Street and along it to the Park Street Station of the Alameda Railroad.

We soon had orders to go to Dublin and run a trial line over the hill from there to Haywards to settle the question whether a connection of the Western Pacific line could be made from Pleasanton to Haywards so as to utilize the existing Haywards railroad as the Oakland branch of the Western Pacific lately acquired by Stanford and associates. However, a few days on the Dublin hill made it certain that there was no advantage in such a cut-off route over the Niles Cañon route and we had an order to abandon the trial line and return to Oakland and to our quarters at Hotel de France.

During 1869 franchises had been obtained from the City of Oakland along First Street and the waterfront lands to connect with the wharf and ferry landing on the west and a new continuous line to a connection with

the Western Pacific location at Vallejo's Mill, later called Niles. The Western Pacific, chartered from Sacramento to San José via Stockton, Livermore Pass and Niles Cañon, had been constructed and the track laid on the first twenty miles from San José (the end being a short distance above Vallejo's Mill), by the original owner, Chas. McLaughlin. It had lately been acquired by Stanford and associates and their purpose now was not only to complete the line as contemplated but to connect it from a point near Vallejo's Mill with Oakland and San Francisco by a trunk line of light grades and first class alignment under another name, but to be eventually consolidated with the Western Pacific and finally, the whole merged in the Central Pacific Railroad Company of California. The San Francisco, Oakland and Alameda Railroad Company was the name used in the construction of this new line.

Early in 1869, Guppy's party, of which I was transit man and in charge of the party whenever he was called away, obtained a boarding place at Capt. Scott's house near Vallejo's Mill and went there to commence the final location from the junction point on the old Western Pacific line about a mile above the mill to Oakland. The line, at the start, was on steep hillsides and followed generally the line of the wood flume carrying water from Alameda Creek to Vallejo's Mill. The water-wheel of that mill was a high overshot wheel and was a prominent land mark for the valley in 1868.

On the request of Mr. Montague, Chief Engineer, A. A. Cohen, then in the employ of the Central Pacific

Law Department, obtained a lease for one year of Vallejo's Mill and the appurtenances thereof, which enabled the railroad company to shut down the mill during the construction of the railroad. About this time a contract was made by the Contract and Finance Company (which was Leland Stanford, Charles Crocker, Mark Hopkins and C. P. Huntington, with Judge E. B. Crocker having some interest), with J. H. Strobridge & Company to do the grading. J. B. Harris, who had been a "Riding Boss," was the company and was the man in charge of the work. As soon as a piece of location was finished, I took charge of the engineering during the construction. Mr. Cohen had obtained Vallejo's consent to reconstruct his flume during the year of the railroad leasehold, so the first move was to tear out the whole flume along the hillside and get the grading done as soon as possible and then to build a new flume on the lower side of and about parallel with the railroad line. When I had to set grades for the railroad carpenters to build the new flume, I was surprised to find how little fall there was from the intake to the mill. However, I had seen the water run at a good speed in the old flume and knew it must do the same in the new one. Mr. Guppy was around only a part of the time and I did the transit work and had charge of the party on the long tangent from the end of the curve where Decoto now is to Bay Avenue, now Fiftieth Avenue, of Oakland. At San Leandro Creek the new line was only a short distance from the line of the Haywards Railroad which was then owned by the Central Pacific interests and was

abandoned a short time after the final completion of the Niles to Oakland direct line.

While the location of this line was going on, I boarded awhile at the Estudillo House in San Leandro. The only transportation was by the steam cars of the San Francisco, Alameda and Haywards Railroad which crossed our new located line at a place later called Simpson's Switch now about Forty-eighth Avenue of the City of Oakland.

Simpson's Switch is remembered as being near where a bad wreck occurred by a collision of the overland train from Oakland Ferry and the Haywards-Alameda local on Sunday morning, November 14, 1869, only six days after the overland commenced running over this route. At this time the new section of road from Niles to San Leandro was completed, but from there to Simpson was not finished. The fills had settled, so the main line had been connected with the old Hayward-Alameda road at San Leandro and the overland trains from Oakland entered the old local track at Simpson's and got back onto their own line at San Leandro. The Hayward-Alameda local trains also used their own line from San Leandro to Simpson's, but at that point did not leave their own track, but continued on to Alameda and were soon out of sight of the junction point.

By the time table the trains in the accident were due at Simpson's Switch at the same time, but, of course, the local was to pass toward Alameda before the overland entered as it was a single track line. The overland arrived on time or a little before, the local was a little

late. The attendant at the switch was an ordinary man whose pay was not large enough to justify expecting any great skill or judgment from him. As the overland approached at slow speed on a little down grade (his switch was of the stub kind and was set leading toward Alameda), the overland engineer whistled, which the switchman understood to be an order to throw over his switch to the Oakland track, otherwise, if the overland continued it would run off the open switch. The switchman knew the local had not passed, but perhaps thought it might be considerably late and held at San Leandro, at any rate he threw his switch over to the Oakland track and let the overland in on the Alameda track. As soon as the overland engineer saw the switch target right for him he opened his throttle and gained speed rapidly and soon met the local coming full speed. The weather was clear at San Leandro, but was foggy across the marsh so the speed was not checked at the time of the collision. Both engines were destroyed, and most of the local train and the forward coaches of the overland train were telescoped. Some fourteen people were killed and many injured. Amongst the killed on the overland train was U. S. District Judge Baldwin for the district of Nevada. Robert Owen was conductor of the Alameda local; he was knocked senseless, but recovered and now resides at No. 2605 Central Avenue, corner of Broadway, Alameda.

The principal reason of the disaster was bad management at headquarters, contributed to in some degree by incompetence of employees. However, the switchman

was made the "goat." A. A. Cohen was instructed by Stanford to make settlement of all damage claims as soon as possible, which he did and I think but very few people know the amount of money paid out by the company for that purpose.

At this time I was acting as road-master as well as engineer of new construction and the track men of both the Oakland and Alameda locals were under my charge.

During the summer of 1869 the track was completed from Sacramento, Stockton, Lathrop and Livermore Pass to San José; also, the new line from junction above Niles to San Leandro and the overland freight was routed that way to San Francisco during the month of September, using the old track of the Alameda local from San Leandro to the wharf and slip at the west end of Pacific Avenue.

During the summer, the old steamer "Oakland" (long since gone to the scrap heap), had been strengthened and converted into a car ferryboat capable of carrying four freight cars at a time. Captains John and Ed. Hackett were in charge of the "Oakland" on two shifts. At about the same time a freight slip and small freight yard were being constructed on block 9 at the foot of Second Street in San Francisco. This block, bounded by Townsend, King, Second and Japan Streets, was formerly occupied and owned by Captain Tichnour and used in connection with the waterfront property outside of it as shipways for cleaning and repairing small vessels, but had lately been purchased from him by the company, and the car ferry steamer "Thoroughfare"

was built on those ways in 1869 and 1870. Pat Tiernan was the man in charge of the building of the "Thoroughfare" and Captain Ed Foster was supervising engineer in charge of the machinery. The engines for the boat were built at the company's shops at Sacramento under A. J. Stevens from patterns of the old steamer "Washoe." The "Oakland" went into service and the freight business via Alameda commenced in the early part of September, 1869, and continued on that route till the freight slip at Oakland wharf and the new line through First Street, Oakland, were constructed and put in operation in 1870.

From November 8, 1869, to the completion of the First Street line, and the extension of Oakland Wharf to deeper water the passenger trains ran over the Seventh Street local track from Brooklyn to Oakland Wharf, now the Mole. The axis of the first car-ferry slip at San Francisco used by the converted steamer "Oakland," was nearly parallel to Second Street as were also the six tracks and freight shed for handling freight of the Central Pacific Railroad Company at the foot of Second Street, San Francisco. But after a short time it was certain more room was necessary which it was not practical to obtain by any extension of the existing layout.

During the year 1869, the trestle on the Seventh Street line of Oakland between Oak Street Station and Clinton Station was reconstructed on a new grade and the opening swing bridge for the passage of small vessels closed. A trestle on the main line from Brooklyn to solid land at the head of the Estuary on the Kennedy

Ranch was finished, forming a connection of the Oakland local and the main line. The trestle on the First Street line across the Lake Merritt branch of the Estuary and the connection of the First Street line with the Seventh Street line at West Oakland by a long curve, was all going on during the year 1869. I moved my boarding place from the Hotel de France to Mrs. Long's on Seward Street, West Oakland, to be more convenient to the pile driving work then going on.

In 1871, it being settled that a change in the freight yards in San Francisco would have to be made involving much engineering work there, I found a boarding place at 730 Howard Street, between Third and Fourth Streets in San Francisco and I moved over there from Oakland.

In 1871 franchises from the City of San Francisco were obtained for tracks from a new slip to be built near the foot of Second Street, crossing the freight yard then in use and cutting through the freight shed on the line of King Street and along King Street across Third Street and the Omnibus Railroad Company tracks, thence curving on to the tier of blocks between King and Townsend Streets, crossing Fourth Street and branching out into some ten tracks across Fifth and Sixth Streets and connecting with the Southern Pacific lines in Townsend Street; also, a line out of this yard crossing Fourth Street on a curve to the northeast, crossing King, Berry and Channel Streets on a center line at Channel distant 186½ feet from the easterly line of Fourth Street. This last mentioned curved line was

for the purpose of reaching the submerged lands of the Mission Bay grant of thirty acres each to the Western and Southern Pacific Railroad Companies. The Western Pacific was now consolidated with and formed a part of the Central Pacific Railroad.

The Southern Pacific Railroad had a separate organization but the ownership was the same in both companies. At this time S. S. Montague was Chief Engineer of the Central Pacific and Colonel George E. Gray, Chief Engineer of the Southern Pacific. The work on the Misssion Bay grant of the two companies was done in common; I looked to Mr. Montague for my orders, but kept Colonel Gray informed of what I was doing.

From 1871 on, for the next five years, my position was that of Assistant Engineer of the Central Pacific Railroad Company, in charge of the local engineering work in San Francisco and Oakland. A. R. Guppy, who was a more experienced locating engineer than I, being needed elsewhere, while I understood construction and track work better than he. My orders came from the Chief Engineer direct, and for a time a portion of my salary was charged to the Southern Pacific through the office of the Contract and Finance Company and later the Western Development Company.

The places where I lived in San Francisco during these years were as follows: At 730 Howard Street in 1871; the Keane House 317 Third Street near Folsom Street, 1872; at Mrs. Seymour's 30 Stanley Place, 1873, 1874 and 1875; at the Hayward House on Third Street, north of Howard Street; at the Hubbard House on the

easterly side of Fourth Street near Howard Street; at Mrs. Bissett's, 128 and 130 Tyler Street, now Golden Gate Avenue, 1877, 1878, 1879, 1880 and 1881.

On May 30, 1881, Mrs. Bissett moved her boarding house from the Thomas Knight House 128-130 Tyler Street, to 311 Stockton Street, west side, between Post and Sutter Streets and my nephew, George Talcott, and I moved with her. He was, at that time, working with me on general work of the engineering department. Later he went back to his home in Williston, Vermont, and died there of consumption in the latter part of the year 1883.

Early in the year 1872, I rented from William Giselman, a one-story tenement house, the property of S. C. Hastings, on Haggin Street between King and Berry Streets for an engineer's office for the railroad company and it was so used until the completion of the general office building of the Central and Southern Pacific Railroad Companies, a three-story brick building, completed and occupied in the fall of 1873. My office in the new building was room No. 47 on the third floor at the northerly end of the building, directly over Mr. Montague's office. Colonel Gray's office and the Southern Pacific drafting room were also on the third floor, near the end of the Townsend Street wing.

By the Act of the Legislature granting the sixty (60) acres of submerged land in Mission Bay, it was contemplated that the Western and Southern Pacific Railroad Companies were to make that location their terminal in San Francisco and to build their road, or roads,

from there south, by some route to be chosen later. With this idea, Colonel Gray had a map prepared showing line midway on the block between Kentucky and Illinois Streets and the extension of that line across the Islais Creek bed, but that scheme was not carried out, a line west of Kentucky Street being chosen.

At the time I took charge of the work, no filling had taken place south of Channel Street. There was a narrow pile bridge from the northerly line of Channel Street along the extension of Fourth Street to Kentucky Street and thence along Kentucky Street to the shore of the Potrero. This pile bridge was the property of the Mission Bay Bridge Company and had a single opening, a small swing bridge located about a hundred feet south of Channel Street. Channel Street canal was blocked by the pile bridge. This was a toll bridge and the toll house and gate were near the drawbridge. The Potrero and Bayview Railroad, a horse car line, also had tracks over this bridge. However, the ownership of both was now the Central Pacific parties, but they were operated under different franchises so had to keep separate accounts of construction and repairs. There was also a small branch wharf extending out along Merrimac Street known as the Cattle Wharf. About this time I was ordered by Mr. Montague to take charge of the new construction and maintenance of these structures as well as the Market Street Railway Company track of which Thomas Agnew was then operating superintendent, and J. L. Willcutt, managing director. However, the rush work of the year of 1872 was the construction of the new

freight yard and a receiving shed on Townsend Street from Fourth to Sixth Street and a delivery shed fronting on King Street opposite. The freight office was upstairs on the King Street side, the two sheds being connected by a foot bridge over the car tracks.

Richard Montague, brother of the chief engineer, was the local freight agent when the buildings were completed and Jacob Wheeler was the yard master. Richard Montague died and was succeeded by John Anthony as local freight agent. The plans of the General Office building were made by Wright & Saunders, architects, and the construction was carried on under Arthur Brown, superintendent of bridges and buildings of the company, E. R. Shain was in charge of the brick work. There was a time limit for the expenditure of $300,000.00 and the use of the Mission Bay grant for depot purposes, so the work of both filling and pile-driving had to be rushed. However, I had the required tracks constructed on time and the engine "Gray Eagle" from the Townsend Street yard, took a train of loaded freight cars around the curve, across the railroad draw-bridge just constructed, to the warehouse at Kentucky and Merrimac Streets.

At this time the freight business of the Southern Pacific, Northern Division, was on Townsend Street between Fifth and Sixth Streets, this business was done separately from the Central Pacific business. A. C. Bassett was Superintendent of this division and John T. Wilson, Master Mechanic. A. N. Towne was General Superintendent of the Central and Southern Pacific

lines except this northern division. At the time I first commenced work, Charles Crocker was superintendent of the operation as well as the construction. He personally, paid off the men. Soon John Corning came as assistant general superintendent and continued in that position after A. N. Towne came in 1869. Corning died November 17, 1878.

Chapter 4.

RAILROAD OWNERS OF THE CENTRAL AND SOUTHERN PACIFIC RAILROADS.

I was fairly well acquainted with Charles Crocker from the fall of 1866 on. I was also acquainted with Mark Hopkins in Sacramento, as Mr. Montague would frequently tell me to come along with him when he consulted Mr. Hopkins about expenditure of money. C. P. Huntington I had only seen a few times prior to the construction of the general office as his residence was in New York. Governor Stanford I knew by sight only, until after the offices were moved to Fourth and Townsend Streets. Soon after this, work was started on the grading and walls and foundations for the private residences of Stanford, Hopkins and Crocker on California Street and I had to give lines and look after that work the same as if it was railroad construction. In this way I became well acquainted with Governor Stanford, as he was usually called, and also better acquainted with Mr. Hopkins and when Mr. Huntington was here from New York, he would send for me and question me about what I had done since he saw me last. He was not satisfied with general answers, he wanted all the details.

Leland Stanford had been Governor of the State of California during the years 1862 and 1863. He was elected on the Republican Ticket and was one of the so-called war governors of the several states of the Union. He was a power in the political affairs of the

State and had some national reputation. He was a man of imposing appearance, deep chest, large shoulders and arms, large face with whiskers and moustache usually trimmed fairly short. He was rather slow of movement and in business was disposed to procrastinate. In this he was the opposite of Charles Crocker, who wanted everything done *now*. However at that time Stanford was looked upon by the general public as having the most authority of any of the so-called "Big Four."

Charles Crocker, Huntington and Hopkins were well known and successful merchants of Sacramento. E. B. Crocker a brother of Charles Crocker had been a judge of the State Supreme Court and was the legal adviser of the company and its first attorney, he died January 24, 1875. He, like his brother Charles, was a man of great industry and energy.

Mark Hopkins was a thoughtful quiet man of rather slender build, wore long gray whiskers and moustache, and spoke with a slight impediment or lisp. He was the treasurer of the Central Pacific Railroad Company. His nephew E. W. Hopkins was assistant treasurer and did most of the business of the office with the public and that may be the reason Mark Hopkins was known as "Uncle Mark." People spoke to E. W. Hopkins of "Uncle Mark,"—meaning his Uncle Mark.

C. P. Huntington was quite a distinguished appearing man with broad shoulders and a gray beard and moustache. He liked to talk of what he did when he was young and took great satisfaction with his financial success in the world. He liked to have us think he was

close in money matters. As he said, "Nobody can track me by the quarters I have dropped." However when there were several along in a party to lunch or anything of that kind he wanted to pay the bill for all.

Leland Stanford had only one child, Leland Stanford, Junior, who died in 1884, aged about sixteen years. The Stanford University was established at Palo Alto, California, and chartered in November, 1885, the corner stone laid in May, 1887, and instruction began there in the fall of 1891. It was named after him and the largest part of the Stanford fortune was devoted to the endowment of that institution. Leland Stanford, Sr., died at Palo Alto June 21, 1893, aged 69 years and 4 months.

The University as now established and the instruction given there is widely different from what Stanford had in mind when he decided that his fortune should be used for educational purposes. His idea then was to found a practical working school and Girard College in Philadelphia was the model he had in view, and not Harvard or Yale. I have been present when he was discussing that subject with several educators and was present at one of the early talks he had with David Starr Jordan. However, the name Stanford University is probably the most enduring monument to the family name possible.

Collis P. Huntington had one adopted son but he took no part in the business, his nephews, Willard V. Huntington and Henry E. Huntington being his business representatives. Willard was killed in an automobile accident in the State of New York September 28, 1915. Sometime after the death of C. P. Huntington August

14, 1900, Henry E. Huntington married his uncle's widow so the largest part of his uncle's fortune is now in his hands. He is now a prominent resident of Los Angeles County and is a director of the Southern Pacific Company and other corporations and is the owner of one of the most, if not the most, valuable private libraries in the United States.

Mark Hopkins had an adopted son, Timothy Hopkins, now a resident of Palo Alto and one of the Trustees of the Stanford University. He was for several years treasurer of the Southern Pacific Company in San Francisco.

Charles Crocker had a family of four children. His oldest son Charles Frederick Crocker died July 17, 1897, leaving a family. George, the second son, died without children, leaving a large bequest for the study of a cure for cancer. William Crocker, the third son, is now president of and a large stockholder in the Crocker National Bank of San Francisco. Hattie married Mr. Alexander of New York and has resided there for many years, but has large property interests in San Francisco.

While the descendants of the original builders and owners of the railroads of this state still have considerable interests in them the control has long since passed to New York interests and the headquarters and management of the Southern Pacific Company is now there. This was brought about by the genius of E. H. Harriman. During the time of his control of the Central Pacific Railroad he financed and caused to

be built the so-called Lucin cut-off across Great Salt Lake which was completed about the year 1904.

One thing has impressed me in studying the early railroad history, that is, the truth of that great saying of Brutus to Cassius: "There is a tide in the affairs of men, which taken at the flood leads on to fortune," but I think to say in the affairs of some men would be nearer to a correct statement of the truth. The building of the first railroad across the continent at that time was made possible by a combination of men and circumstances but those peculiar circumstances are of rare occurrence.

The employment of Theodore D. Judah as engineer in building the Sacramento Valley Railroad in 1854 had settled in his mind the fact that the most advantageous location across the Sierra Nevada Mountains for an overland railroad was the Bear River, Donner Pass, and Truckee River route with its one summit instead of two summits as on the other routes, so at the first opportunity he sought the aid of Sacramento men of financial resources to make the necessary preliminary surveys, and to enlist larger capital in the enterprise later on.

Judah realized from the first that favorable legislation both State and National would be necessary to the success of the undertaking. He was not only a competent railroad engineer but a skilful promoter and lobbyist. As soon as he had collected the necessary preliminary data he went to New York and Washington to promote the required legislation by Congress and to interest New York capitalists in the undertaking.

Aaron A. Sargent of Nevada City, California, Congressman from his district in California, was a faithful friend of the enterprise from start to finish. The California Senators McDougall and Conness also rendered assistance, but it was uphill work and there is little doubt in my mind had it not been for the approach of war, and the strength of the argument that it was necessary to act at once to save the Pacific Coast in the Union, the required legislation would have failed, and without that as a foundation the financing of the enterprise by the sale of bonds would also have failed.

While on a trip from California on this business Judah died in New York November 2, 1863.

The National legislation and the financing to raise the necessary cash was now the vital part of the enterprise. So Mr. Huntington went to New York to attend to that business and maintained his residence there the remainder of his life with frequent visits to California.

So while Huntington was raising money by selling bonds in the east, Stanford was keeping the Republican party squarely in favor of the enterprise. The rushing and hurry-up disposition of Charles Crocker came into play in hastening the actual work on the ground, with the sound judgment of Mark Hopkins to watch the expenditure of all money.

However there was one notable exception, it is possible to be too close to a thing to see it. John Miller, the Secretary and in charge of the office of the Contract and Finance Company, one of the subordinate corporations of the Railroad Company, deceived Mr. Hopkins com-

pletely and embezzled more than half a million dollars. Miller explained to Mr. Hopkins the reason why he brought his lunch from home in his pocket and ate it in his office, he not only saved the price of a lunch outside but he saved several minutes of time every day over those who went out to lunch. He also asked Mr. Hopkins to look over his books to see how his method of bookkeeping suited him so Mr. Hopkins was completely thrown off the track of what was going on. Miller could get money from the Central Pacific Treasury on the proper voucher, but did no banking directly for the company.

N. T. Smith, Treasurer of the Southern Pacific Railroad Company and of all the local and street railroads owned by the company was my particular friend in the general office building and he was my banker, that is I had a personal account with him. Smith and Governor Stanford came from the same town in New York State and they had been partners in a store here in early days. So some folks thought I was related to the Stanford family.

Chapter 5.

BUILDING THE CABLE RAILROADS OF SAN FRANCISCO

As the result of Stanford, Hopkins and Crocker choosing California Street hill as a residence location for themselves, they had a special interest in the street car transportation and as the Clay Street cable line was being constructed, I was told to study up and keep informed on that subject, which I did. On June 14, 1876, a franchise was granted for a cable railroad on California Street from Kearny Street to First Avenue, to Leland Stanford, Mark Hopkins, David Porter, Isaac Wormser, P. H. Canavan, John E. Shawham, R. N. Graves, Edward B. Pond, John Taylor, R. Adolph Becker, John H. Reddington, Michael Reese, Louis Sloss, David D. Colton and Chas. Crocker and their assigns.

One day, sometime in 1876, in the office at Fourth and Townsend Streets, Mr. Montague said, "Henry, come into the Governor's office with me." We went through Dan Yost's room, he was Stanford's private secretary at that time. The Governor looked up from his desk and Mr. Montague said to him: "Henry is in charge of the local work here including the company's street railroads. In the contemplated building of a road on California Street, I think it would be better for him to get his orders from you direct. It is a business that I don't know anything about and I have other matters that need all my attention, besides, I am frequently out of town when you might want something."

Governor Stanford said, "All right," and from that time on I had the plan for the construction of the California Cable Railroad on my mind. However, I continued to do Central and Southern Pacific work under Mr. Montague the same as I had been doing for the past five years.

One of the things I did about 1875 was to locate what is now the main line from the Oakland wharf (now called the Oakland Mole since it is filled in), to the Pinole Cut north of San Pablo along the bay shore past Point Isabel and the "Cerrito," then across the San Pablo Ranch near Stege's house by a long curve and across Wildcat and San Pablo Creeks. A. R. Guppy had been for sometime at Martinez locating the line along the bluffs of the Straits of Carquinez and my line joined on to his location at the Pinole Cut. While doing this work the party boarded for a short time at Mr. Stege's house. At this time the San Pablo grant was held by the occupants by possession as tenants in common and that protracted litigation of history going on, known as the case of Emerick vs. Alvarado which was in court about forty years.

This line is near the Shellmound at Emeryville. At this time this property was owned by Joseph S. Emery, whom I met at that time. There was also a racetrack there then known as Weird's Track. The Berkeley branch now leaves the main line at about this point, but the location of that branch was made later and I did not do it. The work of acquiring the right of way for the

railroad was done by John J. Haley and this was my first acquaintance with him, and that acquaintance continued up to the time of his death, March 20, 1899. For a long time he was the company's agent for obtaining franchises from the San Francisco Board of Supervisors. The franchise from the city of Oakland, of this San Pablo line, was granted to the Northern Railway Company by Ordinance No. 657 dated February 12, 1876.

During the summer of 1871, Mr. Montague had sent A. R. Guppy with a party including Lewis Tashiera and W. T. Lambie as instrument men, to Lake Tahoe on the suggestion of A. W. Von Schmidt to run a trial line from there to the cañon at the head of the north fork of the American River. Von Schmidt's idea being that a tunnel constructed on such a line and low enough to tap the lake could be built at the joint expense of the railroad company and the City of San Francisco to make that lake available as a source of supply for water and be used, at the same time, as the main line of the Central Pacific Railroad.

About the middle of September, 1871, while working in San Francisco, I received an order from Mr. Montague to drop what I was doing and go and take charge of the party then on Bald Mountain near Soda Springs and try to rush the line to a connection with the railroad on the eastern slope of the mountain. I went by train to Tinker's Station, there got a mule and rode to Guppy's camp. Found Tashiera had gone to the valley sick, Guppy was laid up sick in camp and Lambie was so worn out he could hardly stand on his feet. However, I

pitched in, but after several weeks of hard work there came a heavy storm of rain that turned to snow. We were almost out of provisions and after some days of shivering in camp we received word from Mr. Montague to abandon the work and get to the railroad the best way we could, which we did, taking the instruments and notes to Sacramento, and I returned to my job at San Francisco.

After service in various places, W. T. Lambie was killed by a cave-in during the construction of a tunnel by the City of Los Angeles, January 21, 1900. He was acting as a city inspector at the time of his death.

In 1873, after the extension and enlargement of Oakland wharf and the construction of new slips there, and the Alameda and Oakland Railroads had been consolidated with the Central Pacific, it was decided to abandon the Alameda Ferry at the foot of Pacific Avenue, Alameda, and to construct a connecting link between the Seventh Street Local in Oakland and the track of the Alameda Railroad on Railroad Avenue, now called Lincoln Avenue, Alameda. Said link of new road to start at Harrison Street on Seventh, curving toward the south through Harrison Square and the school lot at the southwest corner of Sixth and Alice Streets, thence along the center of Alice Street to and across the Estuary on a bridge made up of spans of about 50 feet each and a swing span in the navigable channel. Thence (as I remember it the Harrison Square curve was 12 degrees or 478 feet radius), bringing the line across the bridge on a curve to the east-

ward across the salt marsh land and across the high land of E. B. Mastick and joining the old track of the Alameda Road by a curve to the eastward. The Oakland city ordinance granting this franchise for the portion within the limits of that city is No. 534, approved April 21, 1873.

About that time I relocated and double-tracked the Seventh Street line from Oakland Point to the place of turn out of this new Alameda branch at Harrison Street. In this new work, a fill was made between Center and Adeline Streets, where the original track was on a trestle and a reverse curve at Market Street cut out in the alignment.

On the San Francisco side of the bay, I had the Southern Pacific local work to do. The lately constructed line from Potrero Avenue and Ninth Street to a connection on the line of Townsend Street, gave me much trouble at first, as the trestle had been constructed on a grade below and not conforming to the official grade of the cross streets as established by the city, and close by was the open waterway of Mission Creek with mud banks so that embankment material placed there slid into the creek. The city had also let a contract to grade the block of Potrero Avenue at our crossing to the official city grade which would bury our track several feet deep. The only remedy I could think of for this bad situation, was to close Mission Creek as an open water-way above Ninth Street and build a large sewer along its general course for drainage. I reported the situation to Mr. Montague and Colonel Gray

and talked with Mr. Haley and Judge Robert Robinson of the Law Department and they agreed with me that the way out of the trouble was to get an Act of the Legislature authorizing the change and providing means of carrying it out. So Mr. Haley got instructions to carry out the preliminary part of the work.

At that time the men most influential in the Mission were John Center, Claus Spreckels and Joseph Sedgeley, all large property holders along the creek. Haley got them all to join the company in a petition to the Legislature and an Act was passed for laying out a new street and constructing the sewer as asked for. I think this was in 1874.

Ever since I had been on construction work, I had been studying concrete. The reading of General Gilmour's work on "Hydraulic Cement, Lime and Mortar" led in that direction and I thought the construction of this large sewer was the opportunity and the City Engineer at that time, William P. Humphreys, agreed with me at first, but when he heard the howl of the bricklayers against using anything but brick, he changed his mind and I had to be satisfied with brick, and it was so built.

In 1876, soon after the franchise had been granted to Stanford and others for a cable railroad on California Street, Mr. Haley made arrangements for the interested parties to view the ground and talk matters over. It was expected that Stanford, Crocker and Hopkins would be the largest stockholders, but Stanford wanted all the prominent men living in the vicinity to

be interested. P. H. Canavan, who had been a Commissioner in building the City Hall, was the most active but he told the others at the beginning that he had but little money to put in. David Porter, who lived opposite the Stanford house where a part of the Fairmont Hotel now stands, was also active in getting the scheme started but could only pay for a few shares of stock. Isaac Wormser, who lived on California Street, near Franklin Street, also took an active interest.

On the day appointed, I was asked to go along, and most of the incorporators were there, but Crocker and Hopkins did not go. After looking over the ground from Kearny Street to Pierce Street, Mr. Wormser invited the whole party to his house where he set out champagne. The location for a power house was talked over and it was left with Mr. Canavan, Haley and myself to pick a location and report. At this time it seemed to be taken for granted, by all, that I was to be the constructing engineer.

The Clay Street hill cable railroad from Kearny Street to Leavenworth Street had been constructed and put in operation in 1873. It was constructed mostly of wood and was considered an experiment, so a low construction cost was the controlling consideration. It was owned by four men, but they obtained some money by donations from property owners who expected to be benefited by the project. These four men were Andrew S. Hallidie, Joseph Britton, Henry L. Davis and James K. Moffitt. Hallidie was president of the California Wire Works and the manufacture of wire

rope suitable for cable railroads was a part of his business. He was born in Scotland and his name there was Andrew Hallidie Smith but on being naturalized in the United States, he transposed the last two names and made it Andrew Smith Hallidie. Joseph Britton was of the well-known firm of Britton and Rey, lithographers and map makers. Henry L. Davis had been Sheriff of the City and County of San Francisco and James K. Moffitt was of the well-known wholesale paper house of Blake, Moffitt & Towne. Mr. Hallidie had more to do in the mechanical line than the other partners so the work of designing was done largely at Hallidie's place and under his direction. A German draftsman named William Eppelsheimer did considerable of that work and later obtained some patents in that line. However, Hallidie claimed the principal inventions as his own.

John J. Haley, who died March 20, 1899, was then an old man and one of the kind who "knew everybody." He had been in various kinds of business, among others keeping the International Hotel at Kearny and Jackson Streets and he knew all the owners of the Clay Street railroad intimately. At one time it was a saying that the San Francisco Board of Supervisors had thirteen members, twelve elected and one appointed, that one was John J. Haley. In Mr. Haley's talk with the Clay Street Railroad folks, they told him that they had broad patents covering any cable railroad that could be built, but they would join the Stanford parties in building on California Street provided a proper compensation was allowed them for the use of their patents and Mr. Haley understood from them that $40,000.00 was their

idea of such a price; and further, that they would take one-half of the stock of the California Street Company, but the construction plans must be subject to their approval. On this being reported to Governor Stanford, he said, in substance, this: "If I undertake to build the California Street road, I am going to determine what plans will be used and if our lawyers say we infringe any of the patents owned by the Clay Street folks, we will pay them a fair price for them," However, no agreement was reached and the California Street Railroad Company was formed and the Clay Street Railroad folks were not in it finally.

I was told to make an estimate of the cost of a road on my plan of an all concrete and metal structure, said road extending from Kearny Street to Fillmore Street with the engine house and car house at the southeast corner of Larkin and California Streets, including real estate, rolling stock and everything necessary to do business with, and I reported $350,000 as such probable cost. Charles Crocker had taken no part so far except to allow his name to be used as one of the grantees of the franchise and had assigned his interest. Mark Hopkins on hearing of the probable cost said it was too much money to get back in five cent pieces and he told me. "It would probably pay a dividend at the same time as Hotel de Hopkins," meaning his own residence then building on California and Mason Streets. However, Stanford went ahead taking the stock of his associates until, of the 5000 shares of the corporation, he had 4,750, although I think he felt as if his associates in the

Market Street Railroad should have stayed in as the experience gained would accrue to their benefit as well as his own. The Contract and Finance Company and the Western Development Company took no part in this construction.

In the designing of the road structure of the California Street Railroad, I wanted a new kind of rail and I wrote to the manufacturers for a cost estimate and they had answered that they did not want to make it as it would require new rolls and the size of the proposed order did not justify the cost. When Mr. Huntington was in San Francisco the next time, I told him about it and he asked me who I wanted to make the rails. I said the "Cambria." He said, "They will roll them for me. Give me the template of the cross section and specification and I will order them when I get back to New York." He did so and the rails were shipped overland, the freight on them being $33.00 per ton. However, it was of light weight, only 36½ lbs. per yard, but good quality of steel.

At the commencement of this work in 1876, I had with me as draftsman, Colonel Charles Buckley and he made the tracings I gave to Mr. Huntington. Colonel Buckley had been to Alaska in charge of the Russian-American Telegraph Expedition to build a telegraph line to connect with a cable across Bering Straits to Siberia, but the progress was slow and on the demonstrated success of the Atlantic cable, the Buckley expedition was abandoned. He had been an old friend of Mr. Haley, but was broken down in health and soon gave up his job

with me. Then I got George Watriss as draftsman. He had worked on engines and steam-boat work and was a useful man.

The engine house lot had been purchased and the material procured so I started a gang of men at work on the road construction in California Street just east of Larkin Street on July 5, 1877, with "old man" Wright in charge of the gang. The engines were built by Wallace W. Hanscom, the owner of the Hope Iron Works on the Potrero, from drawings made largely by Watriss; the boilers of the locomotive type, by Hinckley, Spiers & Hayes and considerable of the machinery by William H. Birch & Company at 119 Beale Street, San Francisco. T. J. Thomas was head carpenter and model maker and my righthand man. About this time William H. Milliken, who had been shop foreman in the Central Pacific Shops at Sacramento, came to work for me as master mechanic. Capt. N. T. Smith was treasurer of the company and paid all bills. W. T. Hinchman was appointed by Governor Stanford as secretary and accountant. The entire working force was under my charge and I made most of the purchases of material.

The road was open for business in April, 1878, from Kearny to Fillmore Streets. There was some delay in the opening date by hot-boxes in the engine bearings, but finally that difficulty was overcome. In fitting up the grips and car-brakes, I had the services of George W. Douglas who was the best man in the country for that work. I had known him since 1869 when he was Master Car Builder for the Omnibus Railroad Company, the

first street railroad in San Francisco. His work required great skill and Douglas had that.

During the spring of 1879, an extension of the road was built from Fillmore Street to a new terminal in California Street about 150 feet west of Central Avenue now called Presidio Avenue, but instead of using the ribs made of old railroad iron embodied in concrete and paved with basalt blocks and grouted with Portland cement mortar as in the original road, a square wood frame was used and a plank roadway. The reason for doing this was that the company had no debt and was paying a dividend and they wanted to pay for any additional construction out of the earnings. This extension was put into use Decoration Day, May 30, 1879. However, this trying to economize on first cost, was a mistake and after a few years, this extension was built over, similar to but not exactly like the original plan of construction.

Thomas Seale, a brother of Henry Seale of Menlo Park who was a friend of Leland Stanford, had worked for me as a foreman and after the road was in full operation, Stanford appointed him superintendent to operate the road and I gave most of my time to preliminary plans for the conversion of the Market Street road, then a horse-car line, and its contemplated branches, into a cable railroad system. However, I continued to do work for the California Street road for some time after. Hinchman, the secretary, and Thomas Seale, the superintendent, both friends of and appointed by Stanford, were always hostile to each other, so it

made a disagreeable situation and I think this was the moving cause of Stanford selling out his controlling interest in the road to other capitalists, first Lloyd Tevis and D. O. Mills, then Charles Mayne, Robert Watt, J. B. Stetson, Antone Borel and others.

The same rails I had put down in the original construction of the California Street road from Kearny Street to Fillmore Street, remained in continuous use during working hours (except about four months at the time of the earthquake of April, 1906),—from April, 1878, to July, 1909, a period of about 31 years, and the same slot rails are now in good condition after 43 years' use.

In the year 1890, the company decided to extend the road eastward to Market Street and to build a cross-town line along Hyde Street from the north end at Beach Street to Pine Street, then east two blocks on Pine Street to Jones Street and along it to Market Street; also, down O'Farrell Street to Market Street. This work was carried out at the time J. B. Stetson was president of the company. James W. Harris, who commenced work for me building the extension in April, 1879, was operating superintendent. J. C. H. Stut was mechanical engineer and designer of the machinery and Howard C. Holmes was engineer of the road construction. In the operation of the right angle route to California Street in addition to the original line, it was decided best to move the location of the power and car-house from the southeast corner of California and Larkin Streets to the southwest corner of California and

Hyde Streets and to procure new engines and driving machinery. The character of the car was also changed from a closed car, coupled to an open grip car or "dummy" to a single body mounted on two, four wheel trucks, the grip being hung in one of the trucks but capable of being operated from either end. The car, so arranged, had a closed body in the center and an open section on each end. This truck arrangement was copied after the Market Street cars then in operation, but the California Street slots were arranged for a switch while the Market Street systems' slots were arranged to run always forward so had to turn around for the return trip. The cross-town line, also had several other cable lines to cross, having a superior right by reason of being on the ground first with an older franchise which made it necessary to modify the form of grip bottom used on the cross-town lines. James W. Harris has lately been elected president of the company to succeed J. Henry Meyer, the banker.

From the time of the completion of the Market Street system, namely, along Valencia to the car-house at Twenty-eighth Street; the Haight Street branch, a new road from Market Street to Stanyan Street; and the McAllister Street line from Market Street along McAllister Street to Central Avenue, thence diagonally southwesterly across the block between the engine house of that branch and the carhouse to Masonic Avenue and Fulton Street thence along Fulton Street to Stanyan Street; my mind had followed the progress of the cable railroad business in the eastern states.

The building of the Hayes Street branch at a later date with its independent power and carhouse near Masonic Avenue was in charge of Fred Tucker who had worked for me on the latter part of the California Street work while the chimney and carhouse work was done by the Pacific Improvement Company men from Fourth and Townsend Streets. However, this branch was a duplication of other Market Street appliances, as it was a branch of the main system. At this time, that portion of the Market Street system from the junction of Valencia Street to Castro Street was operated by steam-dummy engines, but this part of the line and an extension of it along Castro Street to Clipper Street was rebuilt as a cable line later. The driving apparatus for the cable of this line had been provided for in the main driving machinery located at the junction of Market and Valencia Streets, there being four main cables driven from that plant; namely, one to the Ferry and return; one on Valencia Street to Twenty-eighth Street and return; one on Haight Street to Stanyan Street and return and one along Market Street curving into Castro Street and along that street to Clipper Street and return. This last named cable construction on the Market Street extension and Castro Street was in charge of L. M. Clement who took charge of the local work in San Francisco after I became engaged in looking after my patent interests in the eastern states. I worked in San Francisco after that, however, but always with the understanding that I could drop it and go at any time I might think it to be to my advantage.

Soon after the Clay Street cable road was in operation, Henry Casebolt, who owned a controlling interest in the Sutter Street Railroad Company, a horse car line, commenced making preparations to change the Sutter Street line from horse to cable power. Casebolt, himself, was a carriage and car builder by trade and he had, in his employ, Asa E. Hovey, generally known as "Yank," as master mechanic and inventor. Casebolt was hostile to the Clay Street people and he told Hovey that they would invent a cable system of their own better than Hallidie's but he wanted their construction to be cheap in first cost so they started with this cheapness of construction as the controlling idea. Hovey invented a gripping device entirely different from Hallidie's, the operating mechanism being within the underground tube and the cable was grasped by rollers instead of fixed dies and the power was applied by the operator by a lever working through the slot into the tube instead of a screw working through a nut in the center of a hand-wheel as was done in the Hallidie grip. The tube was built of wood, switches were used instead of turn-tables at the terminals and a separate open dummy was used, the power house being located at Larkin, south of Bush Street and west of Larkin Street. This cable road along Sutter Street from Sansome to Larkin Street was put in operation in 1876 between two sections of horse-operated road of the same company and was fairly successful but had many troubles and had to make numerous changes. However, they continued to operate without paying any royalty for the

Hallidie patents till all the cable patents owned by the Hallidie parties, Hovey, Casebolt and myself were acquired by the Pacific Cable Railway Company and all of the Railroad Company's operating cable railroads west of the 106th degree of longitude, west from Greenwich, took out a blanket license from that company. This was about the year 1885.

Chapter 6.

BUILDING THE CABLE RAILROADS OF SAN FRANCISCO. (CONTINUED).

The Construction of the California Street Cable Railroad in 1877 was not an epoch making event in railroad transportation, but was in the use of concrete construction. It was the first use of a structure made up of wrought metal buried in concrete and moulded to form in place, and it was completely successful although the quality of the concrete used in that construction was not of a high grade and the cost per yard in place was low. At that time the retail price of Portland cement was $5.50 per barrel, while plenty of Rosendale or natural cement could be had for $2.75 per barrel, so I used the Portland sparingly and the mass was a mixture of Niles gravel, a little sand, Rosendale cement and lime paste equal to about 10% of the volume of neat cement. The concrete was mixed at the yard by the railroad track on Berry Street and hauled to the work along California Street in horse carts after mixing. In all plastering, grouting, setting machinery, etc., the Portland cement was used. At that time, English wet process cement was the only kind on the market here, but a few years later there was plenty of German, Belgian and French makes to be had. "Dykerhoff" brand of German cement was considered to be A-1. The dry process of the German manufacturers had greatly increased the capacity of the works.

At this time and long after, but few people understood the meaning of the words "Portland cement" and even now many people do not understand its meaning. The foundation of the art of its manufacture was the English patent granted to Joseph Aspdin, a bricklayer of Leeds, No. 5022, of December 18, 1824, and as it resembled Portland stone when used, he gave it the name of Portland cement, but the cement was never manufactured in Portland. The principles set out in that patent for the manufacture of an artificial hydraulic cement by mixing exact proportions of lime and clay and burning the mixture in a kiln, then grinding the product to a powder, is now in use the world over. I do not believe there is any other single invention equal to it in importance at the present time.

In 1882, at the time of the building of the Market Street Cable Railroad system, there was not enough of it made in the United States to cut any figure in the market price. That used in this country was principally of English make, London being the chief source of supply, while on June 1, 1908, for use on the Panama Canal, bids were received for furnishing 4½ millions of barrels of American-Portland cement and the contract was awarded to the Atlas Portland Cement Company of Northhampton, Pa., at the price of $1.19 per barrel, delivered "over the rail to ship" at Hoboken, N. J., and about 5½ millions of barrels were so delivered and used in the construction of the canal. The cement so furnished was about of the same quality as that I had paid $5.00 per barrel for in San Francisco in 1877 and used

in the California Street Railroad construction. However, the price of foreign made Portland cement declined steadily as the manufacture of it increased in this country so that at the time of commencing the construction of the Market Street system, it was decided to use Portland cement only and to abandon the use of Rosendale to any extent. I have a memorandum of the purchase "to arrive" from Balfour, Guthrie & Company —3000 barrels English Portland cement—K. B. & S. brand, at $3.37½ per barrel on January 10, 1881. This was about the average price paid for the cement used in the construction of that system during the years 1881-1882 and 1883. About 43,000 barrels were used for that purpose.

But to return to the year 1877. When I had made up my mind how the California Street Cable Railroad should be built, I asked Governor Stanford this question: "In building this road, what consideration is to be given to the question of patents, as we know the Clay Street people claim to have patents covering any cable road and that the Sutter Street construction was an infringement." He said, "You are the doctor; go ahead and build the best road that can be built and if our lawyers say that you infringe the Clay Street folks' patents, we will pay for them, but if they say you did not infringe, we will not pay till we have to."

I went ahead, under these instructions, not thinking of getting patents myself, as my ideas at that time were entirely defensive. But, on the completion of that road, and the starting on the Market Street work, Mr. Mon-

tague said to me, "If I was in your place, I would patent these new devices yourself as a defensive measure." However, I was a little cautious about doing so for fear of offending the owners of the road but later on, as the patent attorney employed by the company, Milton A. Wheaton, advised me to do the same thing, I did it, but rather late as my most valuable patent was beaten in the Supreme Court of the United States on the ground that it had been in public use on the California Street road while I was in charge, for a period of more than two years, before I applied for the patent. That patent was No. 22,126 granted August 1, 1882, to Henry Root for, "Improvement in the construction of cable railways," and the title of the case was "Root vs. the Third Avenue Railroad Company" and is reported in 146 United States, page 210. At the time of this suit, which was decided November 21, 1892, by the Supreme Court of the United States, this patent, with many others owned by me, were pooled by me with those owned by the National Cable Railway Company of New York, which company then maintained an office at room 25, 140 Nassau Street, New York, so while the suit was entirely in my name against the New York Company, mine was a forty per cent interest only and the National Cable Railway Company had a sixty per cent interest.

This pooling contract was made October 21, 1885, for territory east of the 106th Meridian and was the outcome of a settlement made between all of the principal owners of cable railroad patents on the Pacific Coast including the Hallidie, Sutter Street and Stanford parties.

In the summer of 1883, the Hallidie folks had arranged with prominent New York capitalists and promoters to form a corporation under the laws of New York for the purpose of introducing cable railroads in the Eastern States and had retained eminent patent lawyers, including George Harding, Sr., of Philadelphia, and John R. Bennett of New York, and asserting the claim that all the cable railroads in the United States were infringers of the fundamental patents owned by them. William P. Shinn, 2 Wall Street, New York, was elected president of the National Company and James Gamble, formerly manager of the telegraph company in San Francisco, was manager. This move, and the advertising done by the National Company, was largely propaganda to bluff the railroad companies already in operation to buy licenses under the threat of suits and injunctions. However, it did not work that way.

During all these times my work had been varied and had been considerably divided up. In the summer of 1881, after I had started work at the Market Street power house, Mr. Montague fitted out an engineering party for the exploration of the country north of the Union Pacific Railroad and parallel to it. I took an interest in the fitting out of the party under Warner who had worked under me in San Francisco and my nephew, George M. Talcott, went with the party. I kept in touch with their movements during the time they were out. First, they went to Pacific Springs in Wyoming, which is about north of where the city of Rock Springs now is, said Pacific Springs being on the divide

between the Big Sandy and Sweetwater Rivers, the former flowing into Green River, the Colorado, and eventually into the Pacific Ocean; and the Sweetwater into the North Platte and finally reaching the Gulf of Mexico. The running of this line by the Central Pacific Company was largely in the nature of a counter bluff against the Union Pacific Company which had been running lines parallel to the Central and threatening to extend their road to the Pacific Coast. This initial point at Pacific Springs, had strategical advantages as to connections leading west. This line run by Warner's party from there eastward, was along the Sweetwater River and the Neobrara River to Fort Neobrara and ended at O'Neill, Nebraska. Then the party went to Fremont, Nebraska, and from there returned to San Francisco about November 14, 1881, where Warner worked up his notes at Fourth and Townsend Streets. My nephew, George Talcott, returned here with the party but he concluded he had rather be out in the field with a surveying party than to work here with me on construction work so the next year he went up on the Oregon line with a locating party. I have a letter written by him from the engineers' camp in the Sacramento River cañon, 18 miles above the town of Redding, dated May 6, 1882. I rather favored his going as he began to show indications of failing health which continued to grow worse till he returned to his home in Vermont where he died of consumption.

There was considerable delay after the completion of the California Street Cable Railroad in completing

and putting in operation the cable system on Market Street. In the meantime, I was working out plans, making models, and applying for patents on my inventions used on California Street and proposed to be used on the Market Street system. There were so many preliminary questions to be settled. The Market Street lines at this time ran from the waterfront to Twenty-sixth Street; also, one line branched off at Ninth and Market Streets ran along Hayes Street to Laguna Street, along it to McAllister Street, to Fillmore Street, along it to Tyler Street (now Golden Gate Avenue), and along it to Steiner Street, and along it to O'Farrell and along O'Farrell to Divisadero Street, the terminus of that branch. These two lines were in operation as horse-car lines and were profitable. Of course it would cost more to build for cable operations and keep the horse cars running at the same time, but on the other hand, it would inconvenience the patrons and the company might lose patronage by shutting down operations for eight months or a year during the reconstruction. Finally we decided to keep the horse cars running by temporary tracks and shifting sections and the work was carried out that way.

Another question was how the business should be done. On the California Street work, I had been the head of everything and doing nearly everything by force accounts, but in the Market Street Company the ownership was in four parties instead of being practically in one, Stanford, as it had been there. Charles Crocker wanted the accounts and purchasing to be done by their

inside company which had been changed in name from the Western Development Company to the Pacific Improvement Company. Stanford was satisfied to do the same as before, however, Crocker had his way and on the 1st of December, 1880, the bills and payrolls for preliminary work theretofore paid by the Market Street Company of which J. L. Willcutt was secretary and N. T. Smith, treasurer, were turned over to F. S. Douty as secretary of the Pacific Improvement Company.

The next question was providing the cash to pay for it. My estimate of the cost was a million and a half dollars. Through financial agents the information came that James C. Flood would take two million dollars of the bonds bearing six per cent interest at par and pay cash for them. It was decided to authorize a three million dollar issue, secured by a mortgage on all the property of the Market Street Cable Railway Company so as to have a surplus for future extensions. The bonds were not ready when the bills began to be due so the first money used was borrowed on short term notes signed by Stanford, Crocker, Hopkins and Huntington. The two million dollars in Market Street Cable Railway bonds were finally delivered to James C. Flood as soon as they were ready and the cash obtained for them by the Pacific Improvement Company. On the completion of the McAllister Street line and allowing a fair value for the real estate occupied, which the company already owned, the cost was about $1,750,000.

Chapter 7.

RAILROAD FRANCHISES AND PATENTS.

On November 28, 1879, a new franchise had been granted by the Board of Supervisors to the Market Street Cable Railway Company for a term of fifty years from its date of passage, and most of the other street car companies obtained similar franchises, but by the time the bonds were ready and financial arrangements were made, about two and one-half of the fifty years the franchise had to run had already expired, so a new ordinance was passed at the request of the company on June 5, 1882, being No. 1676 with the same enacting clause "for the term of fifty years from and after the passage of this order." The effect was to extend the term of the most valuable franchise about two and one-half years without making the real purpose of the company noticeable to the public or to the other railroad companies. This ordinance was signed by John A. Russell, clerk, and M. C. Blake, Mayor, and ex-officio President of the Board of Supervisors of the City and County of San Francisco. This franchise will expire June 5, 1932.

As soon as the Central Pacific owners were established in their new general office building on the hundred vara lot at the northerly corner of Fourth and Townsend Streets, they began looking for residence locations. Crocker had traveled much since the Over-

land route was completed having been around the world. Stanford also traveled, his trips were usually to New York and Europe. Mark Hopkins stayed in San Francisco most of the time. Huntington was a resident of New York and had been so since Theodore D. Judah died there in 1863, when Huntington assumed charge of all Central Pacific business in New York, but he made long visits to San Francisco and was in constant correspondence with his private business partner, Mark Hopkins, in the hardware business of Huntington, Hopkins & Company.

The California Street Hill was the location chosen for a residence and extensive work of grading for the Stanford residence was started about 1874, on the easterly half of the block between California and Pine Streets, Powell and Mason Streets. Hopkins had also purchased the westerly half of the same block next to Mason Street. Stanford had selected S. C. Bugbee & Sons as architects of his house and Hopkins employed Wright & Saunders as his architects. I had the engineering in setting lines and grades for the work but the plans were made by the architects so I worked to their plans.

Soon after, Charles Crocker purchased most of the block bounded by California, Sacramento, Taylor and Jones Streets for his residence at the corner of California and Taylor, but he started his grading work before he had secured all the frontage in that block on Sacramento Street. He finally purchased all but one 25 foot lot on Sacramento Street, this one lot was owned by

Yung, the undertaker. He failed to come to any agreement with Crocker as to price so Crocker went ahead, completed his residence and then built a high fence around the Yung house and lot, which was an isolated piece out of the Crocker grounds. This controversy gained wide notoriety, the fence being known as a "spite fence." It remained there till after Crocker's death, when his heirs purchased the lot. Crocker's railroad experience in obtaining right of way for that purpose with the right to take private property without the consent of the owner by paying the appraised value, had led him to think he could do the same thing for his own personal purposes.

David D. Colton, known as General Colton, had a fine residence built a few years before on the westerly half of the block bounded by California, Sacramento, Mason and Taylor, now Huntington Park. He was friendly with all the railroad people and was the social chum of Charles Crocker. He was reputed to be a millionaire and well known in San Francisco society and I believe it was largely due to Colton's influence that the railroad people located their residences where they did. About the first of the year 1875, Colton came into the railroad office at Fourth and Townsend Streets, he was elected a director of several of the railroad corporations and was generally looked up to as one of the owners in connection with Stanford, Crocker, Hopkins and Huntington and remained so up to the time of his death, October 9, 1878. After his death, however, it developed that his financial interests in the company were always small

and that his influence was more one of personality than of property. His death was very sudden and has always been something of a mystery. Charles E. Green, later one of the directors of the Crocker National Bank, came to the railroad building in 1875 as private secretary to General Colton; later, and for many years after, he held the same position for Charles Crocker and for his oldest son, Charles Frederick Crocker, then known as "Fred," later as "Colonel Fred," his title being acquired by an appointment on the staff of Governor Perkins with the rank of colonel.

I have omitted to state the fact that in the party that made the first trip over the ground on California Street in 1876 by the grantees of the franchise, was E. J. Robinson, son of Robert Robinson of the Central Pacific Law Department; also, A. S. Hallidie and Joseph Britton of the Clay Street road. E. J. Robinson was named by Stanford to organize the company and he was elected its secretary, which position he held until the appointment of T. W. Hinchman, some time in 1877.

In the operation of the cable railroads then running, I noticed that the stranding of the cable and not the ultimate wearing out was the great drawback to their successful operation, so I tried to study up the process of manufacture to find some way of overcoming that difficulty. In connection with my other railroad inventions I had models made by T. J. Thomas and George W. Douglas in the year 1881 of a machine for the manufacture of wire rope at one operation, from the single wires into strands and from the strands into the finished cable,

the usual practice was to do these things at separate operations, and I was trying to invent a sewing attachment in the laying head of this large machine by means of a shuttle carrying a small wire to prevent any strand, if cut, from unravelling and bunching up in the cable tube. However, I never got this auxiliary attachment perfected and put in operation, but did get a patent on the main machine, that patent is No. 405744 dated June 25, 1889, granted to Henry Root for "machine for making wire rope." The application for this patent was filed May 6, 1881.

Before I obtained this patent I had long contests in interference in the patent office and made a settlement with the Washburn, Moen Company, Worcester, Massachusetts, in regard to territorial rights; also purchased the patents of M. M. Zellars of Kent, Ohio, for a similar purpose, dated April 10, 1883, No. 275743, paid him $1250.00 for it. Zellars made the assignment to me in Cleveland, Ohio, October 2, 1886. On the 19th of October, 1886, I made the settlement with Washburn, Moen Company, in regard to the Wiswell patents, but this was an exchange and no money was paid. At this time I met and talked with both the elder Washburn and Philip Moen, then the president of that company. Mr. Moen expressed surprise at my age as he said he had heard of me frequently through their agents' attorneys and he expected to find me a man, at least, sixty years old. However, I had a pleasant interview with both of them. John C. Dewey, their attorney, drew the necessary

papers which both parties executed there, this removed the danger of a suit for infringement in building a machine like my invention, which was my object in this transaction.

A wire rope making machine following my invention was built at the expense of the Market Street Cable Railway Company and set up and operated in the rear end of the Engine House at the junction of Market and Valencia streets after all these lines were in operation. However, after making their own ropes for a couple of years, arrangements were made by which the ready-made cable could be obtained as cheap as the wire required to make it, so the machine was laid up.

Chapter 8.

SALE OF CABLE RAILROAD PATENTS IN THE EASTERN STATES.

From the summer of 1884 to the year 1892, the street railroad business in the eastern states, that is to say, east of the 106th degree of longitude, west from Greenwich, which is about fifty miles west of Denver, was the principal subject of my thoughts and movements. By the contract with the National Cable Railway Company, the sale of patents in that territory had been delegated to that company. Three pieces of territory had been excepted from that pooling agreement for the reason that the National had sold its rights to that territory before their contract with me, so that they had to except them from my contract; namely, the City of Chicago, in the State of Illinois, the City of Omaha, in the State of Nebraska, and the County of Allegheny, in the State of Pennsylvania, this last named territory including the City of Pittsburgh.

This exception of territory was to my advantage as I was able to sell rights for the patents I owned without extra expense and the money obtained belonged entirely to me, while any rights sold in the territory covered by the pooling agreement had to be divided—60% to the National Company and 40% to me. The company maintained an office at 140 Nassau Street, New York, with the office of Blake, Moffitt &

Towne of San Francisco, and that was the headquarters of all our business. James W. Towne was the resident partner of that firm of paper merchants. I was charged with 40% of the expenses of the National Company's office and, in theory, my part was only to give consent to their acts in making sales but as a matter of fact, I did a large part of the work of negotiating sales and the functions of the parties provided for in the contract were reversed. Charles R. Parsons, whose father was an old friend of Joseph Britton, of the Clay Street Company, was then secretary of the National Company and Henry L. Davis of San Francisco, its president. Parsons did most of the work under my direction and when a matter had been arranged, it was submitted to the San Francisco folks, that was: Hallidie, Britton, Davis and Moffitt, these four controlled the National Company at this time. Parsons' interest was only a salaried one but he took as faithful an interest in the success of the business as if it was entirely his own. However, he always looked upon them as his employers and not me (which was the true fact of the case), we always got along well together and understood each other perfectly. After the company went out of business, Parsons was employed for several years on the staff of the New York Sun and I think was so employed up to about the time of his death, which I think was about 1916.

I received over $20,000.00 royalties on my own patents in the above named excepted territories where the rights of the National Company had already been sold before

their contract with me, $10,000.00 of which was paid to me by Charles T. Yerkes of Chicago.

For its size, Kansas City, Missouri, was the most profitable territory for us in our cable patent business, and St. Louis next. I went to Kansas City in the spring of 1886. The Kansas City Cable Railroad Company's road, leading over the bluff and on a trestle down to the railroad depot, had been started but they were having much trouble by their grip not having power enough to prevent slipping on the cable and they were very willing to accept help in modifying their appliances and we sold them a general license. Robert Gillham was the chief engineer, later he was badly injured by a grip dropping on his head. Next we sold a license to the Metropolitan Company and finally sold the territory of all the remaining part of the city for $40,000.00.

The Chicago City Railroad, on State and other streets there, had been constructed and opened for business in 1882, under the management of C. B. Holmes, its president. The master mechanic of cable appliances in building that road was Asa E. Hovey, known as "Yank" of San Francisco, and who occupied the same position in the building of the Sutter Street road, for Casebolt. During one of Mr. Holmes' visits to San Francisco, he became convinced that the cable system was what they needed on his road so he hired Hovey to go to Chicago and he left here in the spring of 1881 and made his home there permanently.

As soon as the Chicago company decided to build cable roads, they made some kind of an

arrangement for their patents, but they followed my general plan of concrete and metal ribs as I had recommended and shown Mr. Holmes in the California Street road. I had become well acquainted with him on his visits here and I knew he had a large influence with street railroad people all over the United States and I wanted his help and influence with me in the sale of my patents in the east, so I told him I would give him a license to use all my patents on his road for the nominal consideration of $1.00. At that time my rights were principally in the several inventions as the patents had not been issued and some of them not applied for, however he was glad to get from me a blanket license for present and future inventions of mine relating to cable railroads and I was willing to give it for his future influence in my favor. However, he made out a sight draft on Chicago in my favor and asked me to endorse it over to him which I did and he took it along with him. He said, "You don't want to say you gave me this for nothing and in this way I really paid you $4000.00 and you gave it back to me." He always did whatever he could for me and I frequently stayed with him at his home on Prairie Avenue in Chicago.

I made a trip from San Francisco to Chicago in April, 1882, about the time the State Street line of that road was started. I was only away from San Francisco thirteen days. The Chicago Cable railroads, like the Market Street and other cable roads in San Francisco, were built following my plan first used on California Street from Kearny to Fillmore Streets in 1877. The

Market Street construction work was started early in 1881, but there was a year's delay in making final arrangements so the concrete work for the Chicago South Side road was one year ahead of the principal part of the Market Street construction. Large quantities of Portland cement were used on each job. I never knew how much was used in the Chicago work, but I believe the San Francisco work was far more economically handled than the Chicago. However, this Chicago and Kansas City concrete work greatly advanced the introduction of Portland cement concrete into all kinds of building construction. Hovey and Holmes' knowledge of concrete was derived almost entirely from my experience and information.

In trying to sell our cable railroad patents to the railroad president and managers I was generally met with the statement, "Our lawyers have examined your patents and tell us they could probably be beaten in the courts, however, if by buying the rights to use them we could get the benefit of your experience, it might justify us in paying a moderate price for them." While some of them claimed to have valuable patents of their own and wanted to be taken in, we could not do that, so in such cases we generally commenced suits, but on the whole our law business was not successful. One result of those eight years of experience was to give me a wide acquaintance with the owners and managers of the street car business throughout the United States, amongst them was Tom Johnson, later Mayor of Cleveland, Ohio.

CHAPTER 9.

WATCHING THE PROGRESS OF ELECTRIC ROADS.

At the same time this cable railroad business was going on our interests required us to watch closely the progress made by the experiments with the various kinds of electric roads everywhere. I must confess that at this time I did not believe in the ultimate success of the electric roads, but knew there was a popular belief by the public that electricity was the coming motive power, they not knowing that electricity was only a means of transmitting power, generated by a steam engine at the power house, to the several cars along the road, the same as we did by the traveling cable. A large number of well informed people believed that the future electric road was to be developed out of the underground tube used by the cable roads, and that the moving cable was to be replaced by an electric conductor stationary in the said tube, and this idea was finally carried out in some cases, as on Seventh Street in Washington, D. C.

It was quite a generally accepted theory that an overhead conductor and trolley would not be permitted in the streets of large cities, and that furthermore its use would be so impeded by snow and ice of a northern winter as to make its use impractical. All of this we now know was a delusion and the broomstick trolley is the standard street car construction all over the

United States. But on the other hand its cheapness of construction in first cost and operation as compared with cable roads was also a popular delusion which has cost the investors in electric roads millions of dollars.

One of the first electric roads I ever saw was only five or six blocks long in Minneapolis and was a genuine trolley; that is, a little car or truck was towed along on top of the conductor wire; that was before the spring broomstick had been invented. I also saw a third rail conductor in operation in Baltimore, but it was very crude. What I consider the first electric railroad in the United States of the trolley type that has survived and is the standard of today, was the Sprague Road of Richmond, Virginia. They had great trouble at the start from burning out of motors, and other electric apparatus; some of the time being able to run but four out of eighteen cars. I think that was about 1890.

During these several years I considered San Francisco as my home, but traveled around. Was in New York quite a percentage of the time and at my old home in Williston, Vermont, considerably, but always in touch with Charles R. Parsons, at the office in New York.

The outcome of our suit against the Third Avenue Railroad Company of New York, on my concrete and metal tube construction patent No. 262126, dated August 1, 1882, on an application filed by me September 3, 1881, was a great disappointment to me.

This suit was brought by me July 12, 1886, in the joint interest of myself and the National Cable Railway Company, in the Circuit Court for the Southern District of New York. The case was decided by Judge Wallace against me in that court, on the plea that the invention had been in public use on the California Street road in San Francisco for more than two years before I made the application for the patent, and that decision was sustained on appeal by us to the Supreme Court of the United States and the patent declared void for that reason. This last named decision was November 21, 1892. I felt then—and do now—that my use on California Street was an experimental use and was clearly so within the principles laid down by the same court in Nicholson pavement case, 97 United States, p. 126. The United States Supreme Court as constituted in 1892, was as follows:

Melville W. Fuller, Chief Justice; Steven J. Field, John M. Harlan, Horace Gray, Samuel Blatchford, L. Q. C. Lamar, David J. Brewer, Henry B. Brown and George Shiras, Jr., Associate Justices; James H. McKinney, clerk, and John M. Wright, was marshal.

All the above named members of the court are now dead and I believe all the attorneys who took part in the case are also dead, which seems to me rather remarkable and if the patent in controversy had been sustained it also would have died a natural death, as the life term of a patent is only seventeen years, the invention then becoming public property.

However, by reason of this invention being patented the contest over its validity served to advertise it and inform the public as to its utility, and taken as a whole I received a fair compensation for my inventions.

Chapter 10.

REORGANIZATION OF THE STREET RAILROADS IN SAN FRANCISCO, THEIR STOCKS AND BONDS.

Soon after the construction of the Market Street cable railroad in San Francisco, the Omnibus and Powell Street companies converted their roads from horse to cable; they too being financed by bond issues. However they did not feel entirely confident of future dividends on the stock after paying the bond interest, so a consolidation was brought about by which they became merged in a new company, called the "Market Street Railway," which company guaranteed the payment, principal and interest, of the outstanding bonds of the constituent companies and each took stock in the new company according to an agreed scale, "*quantum meruit,*" the guarantee of the bonds of each being taken into consideration. This was about November, 1893. The total number of shares of the new Market Street Railway Company was 187,500; of this 8580 were not issued leaving 178,920 shares to be divided among the owners of the constituent companies.

The shares apportioned to the companies already controlled by the Market Street owners were as follows:

To the Market Street Cable Ry. Co.	115,157	shares
To the Market Street & Fairmont Co.	4,812	"
To the City Railway Company	3,684	"
To the Potrero & Bay View Ry. Co.	2,210	"

To the Southern Heights R. R. Co.	276	"
To the Park & Ocean R. R. Co.	2,878	"
To the Ocean Beach R. R. Co.	818	"
and to the Central Railroad Company	3,053	"
making a total of	132,888	"

which were distributed to the Stanford et al. interests; they having previously acquired the whole capital stock of the above mentioned companies.

The outstanding bonds guaranteed were as follows:

Market Street Cable Railway Company	$3,000,000.
Omnibus Cable Railway Co.	2,000,000.
Ferry & Cliff Railroad	650,000.
Powell Street Railway	700,000.
Park & Cliff Railroad	350,000.
Park & Ocean (already guaranteed)	250,000.
Second mortgage on Omnibus Cable Ry. Co.	15,000.

About July, 1894, the Metropolitan Electric Road was purchased and paid for with 7,250 shares of the treasury stock of the Market Street Company. The Metropolitan commenced operating from the corner of Powell, on Eddy Street to Hyde Street; to O'Farrell Street; to Scott Street; to Fell Street; to Baker Street; to Page Street; to Clayton Street; to Waller Street; to Cole Street; thence on Cole Street to the power house at Carl and Willard Streets.

This road commenced operating from Powell Street to the Carl Street power house in the fall of 1892.

The market value of the new Market Street Railway Company's stock on February 1, 1894, was $32.00 per

share, and I think Martin & Ballard who received their stock for their Powell Street interests sold out at this price. Later all the outstanding stock was bought in by Henry E. Huntington at about $85.00 per share, and the whole capital stock sold including the Central Pacific people's interests, at $100.00 to Brown Bros., bankers, for eastern parties. Sutter Street and San Mateo electric roads were also purchased about the same time by the same parties. The ultimate purpose of the purchase at that time was to convert the entire Market Street system to trolley road, but it was necessary to obtain a modification of the franchise to do so. The notice of consolidation and amalgamation of the several companies into the Market Street Railway was dated October 14, 1893, and signed by J. L. Willcutt, secretary.

The sale of the Market Street consolidated and the Sutter Street and San Mateo roads above mentioned, was about the first of the year 1902. Tirey L. Ford, who had been attorney general of this state, was the agent here for the eastern purchasers. As soon as the sale had been arranged a corporation was formed under the laws of the State of New Jersey, to take the title. The bonded indebtedness of the roads so purchased, amounting to about $13,000,000, remained unpaid, but the interest was paid from the earnings of the roads as it became due. Later a California corporation was formed by the eastern parties, called "The United Railroads of San Francisco" and the title passed to it, with San Francisco men as dummy directors.

The San Mateo electric road, above mentioned, was the first electric road operated in San Francisco; the franchise for it was granted to Behrend Joost and others, December 16, 1890, and it was known as the Joost Road. It ran from the waterfront along Harrison and Bryant Streets to Fourteenth Street; along Fourteenth Street to Guerrero Street; along Guerrero Street to San José Avenue; out San José to Chenery Street, and along the old San José road to the county line and the cemeteries, and was finally extended to San Bruno, Millbrae, Burlingame and San Mateo. On November 16, 1891, the holders of the franchise made affidavit that more than $50,000 had been expended on construction. The brick power house was just north of the Southern Pacific tracks about where Joost Avenue comes into the old San José road about where Thirty-sixth Street would be if the numbered streets had continued. I think this was built during the year 1892, and put in operation that fall. Mr. Joost had made some easy money out of contracts under the French régime on the Panama Canal and had faith that electric roads were the coming thing. However, he had to sell out his interest for what he could get, taking a very serious loss, and John D. Spreckels & Brother became the owners of the road, which they largely reconstructed, and I think they were glad to sell for what the property had cost them.

The Geary Street, Park and Ocean Railroad had been constructed in 1880, as a cable railroad from Kearny Street to Central Avenue, of a rather temporary struc-

ture, and from there on along Geary Street to First Avenue, and along it to Golden Gate Park, as a motor road, operated by steam dummies. The road was 5 feet gauge, the usual horse car gauge, while the Market Street system was of the standard gauge for steam roads, that is 4 feet, eight and a half inches. Soon after the cable system was built the controlling interest in the Geary Street stock was purchased by the Market Street owners, but they did not get the whole. The stock owned by Robert F. Morrow and Adam Grant was not included in the sale. I think the purpose of the purchase of the control of the Geary Street road was to make it a branch of the Market Street cable system, like the McAllister and Hayes Street branches, however it was decided to reconstruct the road with ribs and concrete, change the gauge to make it like the Market Street road and change the style of car and grip to the same as used on the Market Street system. This was done during the year 1892; George W. Douglas was in charge of the mechanical part of the work and A. B. Southard, the civil engineering. I acted as consulting engineer. I obtained three additional lots on First Avenue, adjoining the fifty vara lot at the northwest corner of Geary Street and First Avenue, and a large brick car house was constructed on this lot. The original power plant at the northeast corner of Buchanan and Geary Streets built in the year 1880, was continued in use; large cotton ropes being used for the connection of the engine with the driving gears instead of gears; this method being noiseless. A. W. Barron was

superintendent of operation. The cars were kept running during the reconstruction and the terminal just below Kearny Street was changed from a switching arrangement to a double track turn-table, like that used on Market Street at East Street. This turn-table was opposite the Chronicle office, and M. H. de Young brought suit to have it removed, as a nuisance, but failed and it remained there as long as the road was operated by cable.

At the time of the earthquake and fire, April 18, 1906, the road was damaged, principally by the expansion of rails and slot by the heat of the burning buildings along the streets; the chimney was also cracked and the power house damaged by the quake. However this damage was repaired by the renewal of a few slot bars and rails and some repairs at the power house and the road commenced operation again in the early summer of 1906.

By an oversight the management of this road did not apply for or get a new franchise for a term of fifty years, as could have been done at the time this long term franchise was granted to the other company. The term of the franchise then in use had expired. The company obtained a temporary permit to continue operation by paying the city first 10 per cent. and later 5 per cent. of its earnings. This was preceded by litigation by which the company tried to obtain a renewal of the franchise, but failed, and they were forced to abandon to the city all structures in the public streets, and they were destroyed and sold as junk when the city

took possession and constructed the municipal trolley electric over the same route. The term of the franchise under which the Geary Street cable road was constructed, expired November 6, 1903, but the operation had continued under temporary arrangements from that time on. On April 19, 1912, a contract was let by the city to P. H. Mahoney, to construct the trolley municipal road from Kearny Street to Fifth Avenue, and the cable railroad was broken up by a battering ram dropped like a piledriver, and on December 28, 1912, the first electric car ran over the line and the operation of the municipal system commenced from Kearny Street westward; Mayor Rolph ran the first car over the new road. The roadbed of the Geary Street road which was destroyed to make way for the trolley was one of the best ever constructed and for sometime it was contemplated using it as an underground electric road, but all those plans were finally abandoned, the existing road destroyed and was a total loss, and the standard electric trolley street car line constructed, which was the best thing to do in view of future expansions of the municipal system.

During the year 1894 the Mission Street line of the Market Street Railway Company had been reconstructed as a trolley line from the Oakland Ferry to Twenty-ninth Street, and from that time that appeared to be the coming style of construction, notwithstanding its many shortcomings.

Chapter 11.

PERSONAL INVESTMENTS, ETC.

I had maintained a residence in San Francisco up to the time of the earthquake and fire, residing at the Renton House, 712 Sutter Street, from August 10, 1883, notwithstanding the fact that I was absent more than half of the time during the years we maintained an office at 140 Nassau Street, New York.

I had sold, in the spring of 1893, the whole of the land in San Francisco bounded by Waller, Frederick, Clayton and Cole Streets, now divided into two blocks by Belvedere Street, to John Coop and James W. Smith, for $150,000. Soon after I sold to William Hinckle a fractional block at the northeast corner of Frederick and Clayton Streets, for $40,000. The most of this property I had owned since 1878, having purchased it from Eugene Sullivan, and had used the rock obtained from a quarry on it.

Soon after I sold the above mentioned land I bought considerable property in the vicinity of Twenty-third Avenue and East Fourteenth Street in Oakland, a large part of which I still hold. My purpose in this was to open new streets and improve lines of travel. I had information that the Central Pacific folks, who owned several street car lines in Oakland, would extend their lines out there, however they changed their policy and instead of extending their ownership of street car

property, sold the lines they owned including the East Twelfth Street or Tubbs Hotel line, the Telegraph Avenue and other lines. The Oakland, San Leandro and Haywards line from Twenty-third Avenue along East Fourteenth Street and the San Leandro road were constructed about this time and I induced the company to build down Twenty-fourth Avenue to near the Central Pacific tracks, then over my land, parallel to said tracks to Park Street now called Twenty-third Avenue. E. B. Stone, one of the owners of the Haywards line at this time, was a friend of mine and I made this arrangement with him. At that time the intown terminus of this road was there and a large part of their passengers took the Central Pacific local train there for San Francisco. Finally all the principal street railroads in Oakland were consolidated into one system. The Central Pacific folks sold their street car roads instead of extending and building more and then the San Leandro and Hayward electric road was purchased by the consolidated company thereby forming a continuous line along Fourteenth Street into Oakland and the branch down Twenty-fourth Avenue, to the terminus on my land was abandoned, and that point ceased to be a terminus and transfer point. So, on the whole, my scheme there was not the success I had hoped for.

However, since that time, I have given to the City of Oakland, a new street from East Fourteenth Street to the old county road now called the Foothill Boulevard and have also given a lot at the corner of the new street and East Fifteenth Street for one of the four branch

libraries for which Andrew Carnegie gave $140,000. I made a deed to the City of Oakland, for library purposes only, of this lot 99 74/100 feet on East 15th Street and 120 feet on the new street called the Foothill Boulevard, on September 13, 1916, which deed is recorded in Book 2535 of deeds at page 19, Alameda County records, and the city soon after built the library, on a plan approved by the Carnegie Corporation at a cost of $35,000. J. R. Talcott and I had, previously, given a lot at Fremont Way for the first one of the branches constructed out of this $140,000 fund donated by Carnegie so I feel that if my investment there has not been profitable as a money making scheme, it has been a benefit to the public and a lasting one in the opening of these two libraries.

Chapter 12.

MORE VERMONT HISTORY.

The early history of the State of Vermont has always been interesting to me. Thomas Chittenden the first Governor of the State and one of its founders, was buried in my native town of Williston and the marking of his grave by a small stone was not in keeping with the part he had taken in public affairs, so while I was in Williston in the summer of 1894, I requested the town representative to try to get an Act of the Vermont Legislature authorizing a suitable monument, which he did, carrying an appropriation of $3000 for that purpose. That Act was approved November 14, 1894, and appointed a Commission of five persons to carry out the provisions of the Act, said Commission to be perpetual; on the death of any member, the remaining members, by a majority vote, to fill the vacancy. Ex-Governor John L. Barstow, Probate Judge Torrey E. Wales, A. C. Robinson, Chauncey W. Brownell, Secretary of State, and Henry Root were named by the Act as said Commissioners. As there was no room directly over the grave, I purchased, at my own expense, the house and lot adjoining the cemetery on the west, wrecked the house and gave the land to the Commission as a site for the monument. I also had a design for the monument made in San Francisco by J. C. White and that design was accepted by the Commission except the

deer's head at the top which was changed from granite, as Mr. White had planned, to a bronze head and the monument was so constructed. Marr & Gordon of Barre, Vermont, doing the granite work by contract. This work was done in the year 1895, but the formal dedication did not take place till August 19, 1896. Of the five Commissioners named by the Act, three are dead, Chauncey Brownell and my self alone survive; the other three were older men. H. S. Johnson, the author of the Act and J. C. White, the designer of the monument, are also dead.

My native town of Williston is seven miles easterly from the city of Burlington, Vermont, on Lake Champlain. An incident of interest to me was a talk I had there with Major General Oliver O. Howard, about 1904. James Burke, now post master of Burlington, was then mayor of the city. He owned a blacksmith shop there and continued doing work in his shop in addition to his official duties as mayor of the city. So if he was not in his office at the City Hall people who wanted to see him on any kind of business tried his blacksmith shop. His father, James Burke, was the village blacksmith in Williston so I had known him well from an early date. I called at his shop and was told he was out but might be back any minute, so I sat down on a bench to wait for him. Just then Adjutant General Peck of Vermont, whom I knew well, called, accompanied by Major General Howard, both in uniform. Peck said that General Howard had called at the City Hall to pay his respects to the mayor of Burlington and had been told that he

might find him at his shop. Peck introduced me to General Howard and told him I was a native of Vermont, now a resident of San Francisco. Howard was in a talkative mood. He said, "I lived in San Francisco while I was in command of the department of the Pacific." I had followed the events of the war of the rebellion closely, in which General Howard had taken a very prominent part. He was in command of a brigade under General McDowell at the first battle of Bull Run July 21, 1861, where he had lost an arm. He had a very important part as a corps commander in the battle of Gettysburg on July 1, 1863, but what I wanted to ask him most of all was what was the trouble with General Hooker at the battle of Chancellorville April 28, 1863, in which General Howard took a prominent part, and knew the inside facts better than any man living. Hooker was a Californian and one of the most heroic figures of the War of the Rebellion.

Hooker's crossing of the river and capture of Chancellorville and Chancellors Hotel during the first two days of the battle was a complete success and the reports of the first announcement of the battle was almost like Commodore Perry's on the battle of Lake Erie, "We have met the enemy and they are ours." Then came a lull of two days without news, then rumors of disaster began to come; finally the retreat of Hooker's army across the Rappahannock.

However the Southern army suffered a great loss in the death during that battle of General "Stonewall" Jackson, one of the most prominent leaders on that side

during the war. Later it was said that the capture of the hotel and bar where Hooker made his headquarters was the reason that turned a victory into defeat. This was the question I wanted to ask General Howard and I thought he might be willing to express an opinion. However he took the lead in the subject of the conversation and before I could get a chance to ask my question Mayor Burke appeared and our conversation was ended.

The burial place of Ethan Allen, the captor of Ticonderoga is in the city of Burlington, on the road to Winooski, where he has an imposing monument. I have tried to find the burial place of his brother Ira who died in Philadelphia about 1812 but without success. Ira Allen was the first Surveyor General of the State, the founder of Burlington and of the University of Vermont.

Chapter 13.

FAMOUS MEN I HAVE SEEN.

After General U. S. Grant had finished his second term as President of the United States he made a trip around the world and arrived in San Francisco from China on the Pacific Mail Company's steamer City of Tokio on the night of September 20, 1879. As I was returning from Oakland about five o'clock that afternoon I happened to meet my friend Captain Moses Morton of the Southern Pacific ferry service and he said to me, "I have an order to take the ferry steamer Alameda and put General Grant and party ashore from the anchorage of the City of Tokio when they arrive this evening . Go home and get dinner and come back here and go out with me." I said, "All right, I will."

When I came back I found a large party, the reception committee wearing rosettes and badges, on the boat, and they did not want to let me go on board. However, Captain Morton put in an appearance and reminded them that he was in charge of that boat, that they were only passengers, and told me to come up in the pilot house.

It was about half past seven when the Tokio came to anchor and quite dark. There was no clear understanding as to how we were to approach her so we had something of a mixup. The Tokio was square rigged, to

carry some sail, and in getting alongside one of her yard-arms caught under the stay braces of the Alameda's smoke stack so we could not get into the position provided for us. While we were hung against the Tokio's side I noticed a man who looked to me like General Grant come up stairs from the lower deck of the Alameda and go into the cabin. Finally when everything was ready and the reception committee lined up, they gave the word for General Grant to come ahead. An officer on the Tokio said, "He went on board the ferry boat from a lower gangway some time ago." Then they looked around and found him seated in the Alameda's cabin waiting the next move.

A. J. Bryant was Mayor of San Francisco at that time and was in general charge of Grant's reception and entertainment. Col. Stevenson then more than ninety years old who brought his regiment to San Francisco in 1847, and I think knew General Grant personally, took a prominent part in the reception.

Later, I think it was in 1887, I had a chance to see General Wm. T. Sherman close up. I had occasion to be at the Fifth Avenue Hotel in New York and the General was stopping there at the time. He wore the four stars on the shoulder straps of his uniform so everyone knew who he was. He was skylarking with the ladies like a boy. His face was much furrowed and wrinkled, but he stood erect and was quick motioned.

At one time while in New York, going up Broadway near the General Worth monument, a reception had

been arranged to Grover Cleveland on a grand stand at that place and I happened to be passing just as he arrived in a hack to go up onto the stand and I was jammed up close against him by the crowd. He had just been elected President of the United States and it was also understood that he was engaged to be married. General Phil Sheridan was already on the platform and reached down and took hold of Cleveland's hand as he climbed up the steps. Just then the band already on the platform started playing "Hail to the Chief." Gilmore who was present with his band watched his opportunity and broke in on the cornet with the air from the 'Mikado', "He's going to marry Yum Yum", pandemonium reigned, the crowd yelled and everybody on the platform stood up and laughed. However good the joke it was an embarrassing situation for Cleveland for the next five minutes, to stand there and be laughed at. Finally quiet was restored so he could make himself heard. Generals Grant, Sherman and Sheridan had a prominent part in making history in my time, so I took a great interest in their personality and was glad to see them at close quarters.

My acquaintance with Colonel John S. Mosby was also an interesting event to me. During the war of the Rebellion and in the years 1861-1862 and 1863 in particular Mosby's guerrillas had been the terror of the United States army in Virginia. In fact he was the "Robin Hood" of that time. He was a country lawyer when the war commenced, but soon organized his neighbors into bands for guerrilla warfare, and

they knowing all the trails and by-roads of the country were a formidable enemy to an invading army.

I had many friends in that army with several of whom I kept up a correspondence. My intimate friend Alfred C. Fay of Company E of the 1st Vermont Cavalry was one of them and Ransom T. Fay, his cousin, who was lost in Wilson's raid in 1865, another.

At the close of the war Mosby became a friend of General Grant and for sometime was United States consul general at Hongkong during Grant's presidency. About the year 1900 I lived at the same hotel with Mosby and became well acquainted with him. I had many discussions on various subjects with Mosby.

One of the questions he fired at me over and over again was, "Well, Root, you don't believe the Spaniards blew up the Maine?" which I certainly did not and Mosby was in doubt about it himself. The U. S. armored Cruiser Maine was blown up at her anchorage in the harbor of Havana, Cuba, at 9:40 p. m., February 15, 1898, and that explosion was the immediate cause of the declaration of war by the United States against Spain. The general opinion in the United States was (and that opinion was encouraged by most U. S. government officials), that she was blown up by a torpedo or mine with the connivance of the Spanish officials at Havana. My own opinion is derived from a careful study of the details of the surrounding circumstances and is that the explosion of the magazines of the warship was an accident due probably to defective electric wiring in the magazines. Spanish warships had visited the

harbor of New York a short time before where they decorated ship in the evening with electric lights, and this trip of the Maine to Havana was to return that call. The Maine called at Norfolk on the way south and took on extra dynamos and electrical apparatus. The steam engines driving the dynamos were connected to the main boilers of the ship on the way south so as to increase their speed and raise the voltage on the electric lighting system, which extended through the powder magazines of the ship. The anchorage for her was designated by the harbor master of the port and was satisfactory to Captain Sigsbee as it was a good location for show.

The court of inquiry that convened immediately after the disaster was a farce, the witnesses were largely interested parties or experts who were fully informed what it was desired to prove, and so the verdict was that the disaster was caused by the explosion of a mine outside the ship, and the declaration of war against Spain soon followed. The United States having refused to submit the question at issue to an arbitration of disinterested parties. The subsequent proceedings and the raising of the wreck were directed to the purpose of finding evidence to sustain the original verdict. But this is now history, and some of it not pleasant history to recall.

I always had a desire to see personally the people of whom I read in history. I had read in Harper's Magazine I think in 1856 an article entitled "Scott's Battles in Mexico," and I think it was the next year I had an opportunity to see General Scott at the State Fair in

Burlington, Vermont. He came from Troy, New York, accompanied by Major General John E. Wool; both were old men and had taken part in the war of 1812. Our nearest neighbor in Williston where I was born was Homer Beach and his brother Harmon Beach was a soldier in Scott's army from Vera Cruz to the taking of the City of Mexico in September, 1847. When Harmon returned home he brought his soldier equipment and several pictures of battle scenes of that war, and they made a lasting impression on my mind. When I was at the City of Mexico in 1898 I went out to the Castle of Chapultepec and tried to find the side of the rock from which that view was taken.

David Scannell for several years Chief of the Fire Department of the City of San Francisco was a soldier in Scott's army, and said he was the first man over the wall in the storming of Chapultepec, the last defense of the City of Mexico. At the time I was there the long aqueduct consisting of a series of brick arches from there to the City of Mexico was largely intact but its destruction had commenced in places by cutting streets through it.

Chapter 14.

SAN FRANCISCO EARTHQUAKE AND FIRE EXPERIENCE.

At the time of the great earthquake and fire, at quarter past five o'clock on Wednesday morning, April 18, 1906, I was asleep in my room on the third floor at the southwest corner of the Renton Hotel, 712 Sutter Street. There was a fireplace in the room and when I awoke, bricks shaken off the top of the chimney were falling into the fireplace and everything in the room was hopping around. I was afraid the floor would go down so I rushed out into the hall and grabbed hold of a window casing just as the top section of the chimney came sailing by the window to the ground. As soon as I could get on clothes enough, I went downstairs and out into the street. The building, being of wood, did not go down. The plastering was badly cracked and some spots fell off but the worst feature was the breaking of the water pipes. In most cases it happened that the service pipes fell away from the main so that the pressure dropped and after awhile there was no water to be had, generally speaking, but there were some favored localities where there was water in the mains for some time.

The Renton was on the north side of Sutter Street about forty feet above Taylor Street and Dugan's Drug Store was on the corner below Taylor Street. His entire stock on the shelves was thrown on to the floor, the

bottles broken and the liquids flowed out onto the sidewalk. I started up Taylor Street to try to get a view of the city but the great shake was followed by frequent smaller shakes so it was best to keep in the middle of the street for fear of falling buildings. I soon met my old friend, S. H. Kent, who had formerly been superintendent of streets. He told me he had attended the opera in the Grand Opera House on Mission Street above Third Street the night before and that the house was crowded, with people standing, and if the quake had come seven hours earlier the loss of life would have been very great. Caruso sang there that night.

At California and Taylor Streets I met my friend A. J. Rich, the real estate agent, and we noticed smoke in spots in the mill district south of Market Street, but at that time, we had no idea of the magnitude of the fire that was to follow. During that day I wandered around looking at the buildings that had been wrecked by the 'quake, but was careful not to go into any partially wrecked buildings as there were frequent small shocks during the day. The fire spread and sprung up in new places so that by evening, it was apparent that our house was in jeopardy but I continued to go in and out of the house. Soon after midnight, the people of the house took what they could carry down to the lower floor and waited the final word to get out. It came about half past three on the morning of April 19th. There were soldiers patrolling the streets and constant reports from the blowing-up of the buildings by them. The blasting not only jeopardizing the lives of the

people, but spreading the fire as well, and prevented the Fire Department, already badly crippled, from doing anything.

I went west along Sutter Street to Van Ness Avenue, then north to 1532 Green Street where Rosalind Bryant and Susie Wells were living. Rosalind Bryant is the daughter of Andrew J. Bryant, deceased, formerly Mayor of San Francisco and Susie Wells, the daughter of Asa R. Wells, deceased, formerly Auditor of San Francisco. Both these men were well known and active figures in San Francisco. The place where Miss Bryant and Miss Wells lived appeared to be out of reach of the fire. About seven o'clock that morning I went up on to Russian Hill to take a look. Finally took my tin box containing papers and started for Oakland Ferry, along Union Street to Montgomery Avenue, and along it to Broadway and down it to East Street, then to the foot of Market Street. The boat was packed to capacity with refugees, this was about noon of the day after the earthquake. The fire revived and the next day burned entirely over the ground over which I had traveled. I went to the house of my friends Mr. and Mrs. H. C. Casidy on 28th Avenue, Oakland, making my home there with them until about the first of August, 1906, when I obtained a boarding place at the Waldemar, 300 Baker Street, at the corner of Fell Street, San Francisco, having rooms in the Annex on Fell Street where I have made my home for the past fifteen years, retaining my rooms during my absences on visits east.

When I went to Oakland on April 19th, I expected to return after getting some sleep, but found that the trains and boats for San Francisco were prohibited from carrying anyone unless they had a pass from Governor Pardee or his authorized agents. I went to the Oakland City Hall and asked R. M. Clement, formerly City Engineer, to get me the required pass, which he did. So on Tuesday morning, April 24th, I took the local 7th Street steam train from Fruitvale station for my first visit to the ruins of San Francisco. On landing walked north along the waterfront to Bay Street then along it to Fort Mason where there was a large camp of refugees being fed by the United States.

From there I went to 1532 Green Street, got my handbag, coat and umbrella which I had left there on the morning of the 19th, took a little lunch in my hand and started along Franklin Street to Ellis Street, just outside the burned area, then to Laguna and Eddy Streets, then to Alamo Square,then to the McAllister Street Power House. Then across the panhandle of Golden Gate Park at Lyon Street and up to Seth Talcott's house at 47 South Broderick Street. In crossing the Haight Street cable line, which I had built 24 years before, the slot and roadbed appeared to be all right. Dr. Wagner's family were all there at Seth's house, all short of money. I gave Seth $60.00 I had in my pocket and started on to Fourteenth Street, down Fourteenth Street to Noe Street, then across Market Street and down Seventeenth Street to Dolores Street, to Eighteenth. The high school building there was being used

as a Commissary Station to feed those burned out of a home. Then I went along Dolores to Twentieth Street, all buildings east of Dolores Street and north of Twentieth Street were burned. Then I went down Twentieth Street to Valencia Street, then north along it at a line about 200 feet north of Nineteenth Street. The cable tracks were sheered off by the earthquake and dropped square down four and a half feet and were thrown sideways to the east about six feet. This condition extended to near Eighteenth Street, all buildings around there were burned. The hotel on the corner of Eighteenth Street was completely wrecked by the earthquake with a large loss of life and later the wreckage burned.

The Spring Valley Water Company had men laying a temporary pipe on the surface over the sunken section and expected to have it connected that night. I went on past the Power House of the Market Street Cable Railway Company which had been burned, leaving about 90 feet of the chimney standing. Then I continued along Market Street to Eighth Street there was stopped by a policeman who said the street was closed to dynamite the walls left standing by the fire, so I turned southeast to Mission Street and along it to East Street and the Oakland Ferry. That route was through a mass of ruins and in the street near Fremont Street were the dead bodies of a herd of cattle trapped there in the fire and burned to death. When I reached the Oakland Ferry, near six o'clock, with my bag, overcoat and umbrella, I had been on the tramp almost continuously

since morning and was never more tired in my life than when I reached the Casidy's at Fruitvale.

On the completion of this trip, I realized for the first time the extent of the damage done by the great earthquake and the fire caused by it to the city of San Francisco and it seemed then that it would take thirty years for the city to recover from the disaster. The loss of life was never known exactly, but was probably about 480. The Valencia Hotel at the corner of Valencia and Eighteenth Streets and the lodging house at Sixth and Howard were two of the places destroyed with large loss of life, and at numerous other places people were killed by the falling of fire walls or chimneys. However, the loss of life was small compared to what it would have been had the earthquake occurred at any other time of the day. The property loss probably was over three hundred million dollars, but no one can tell within a wide range what it was. The so-called permanent and fire-proof part of the city was practically destroyed, all the wholesale houses, banks, large hotels and stores were gone and in many places it was impossible to see where the streets were as the burned area was a continuous field of ruins, the walls of buildings having fallen into the street and obliterated them.

The Palace Hotel walls were standing. The interior partitions of it being largely of brick served to support the outer walls after all the wood work was destroyed by the fire, however there was no salvage as the con-

tractor who cleared the lot for rebuilding was given all the material obtained and $100,000.00 for the job. The Palace was constructed in 1874 and 1875 by William C. Ralston, then president of the Bank of California, without regard to cost and was a monument to the architecture of that time.

The Ferry Building, at the foot of Market Street, remained in commission but the tower, built of stone, was badly cracked and was a danger to the people using the building until the stone veneering was removed and replaced by concrete.

At the time I made this trip, April 24, 1906, there was not a street car running in San Francisco but the United Railroads Company was making preparations to string trolley wires over the cable tracks on Market Street. This was their opportunity to do it, as no franchise was required to do anything then only to get the consent of Abe Ruef, the political boss at that time, who later was sent to the State's Prison for his acts while Eugene Schmitz was mayor of the city.

In Oakland there was no fire and the earthquake damage not as large, relatively, as in San Francisco, however considerable damage was done by falling chimneys, fire walls and broken glass.

Just before the earthquake I had purchased the two 50-vara lots constituting the whole frontage on the easterly side of Polk Street from Chestnut to Francisco Street. My purpose in doing this was largely founded on the belief that I could benefit the public without loss

to myself by getting new grades established and the streets and block graded which I eventually did. However the time, trouble and expense of doing it were much larger than I had expected so that the ultimate profit to myself is problematical, but as to the public benefit of my work there I feel there can be no question. I paid all the expenses of carrying the legal questions involved to the State Supreme Court for final determination and the ultimate result was the filling in and regrading of that district and extending the Polk Street car line to the bay.

I also induced my friend M. M. O'Shaughnessey, City Engineer of San Francisco, to father the plan I had laid out for a 16% grade up Francisco Street and along Larkin Street to Chestnut Street by dividing parts of those streets by retaining walls, grading and paving the surface of the roadway with brick. This work was completed and opened to the public about the first of the year 1917 and is a good piece of work. This contract was let to F. Rolandi, September 2, 1915. Total price $30,900. All the abutting property holders paid their assessment for this work as made out by the City Engineer's office without any suits being brought, my assessment was $2,884.00, which I paid.

Since the grade questions have been settled and the street improvements made, the School Department of the city have purchased the block of about six 50-vara lots bounded by Van Ness Avenue, Bay, Polk and Francisco Streets for a new high school, which is to be

erected there at an estimated cost of more than a million dollars. I understand that $112,000.00 was paid for the land, the plans are ready and the bonds to pay for the work issued, but there is no sale for them at present, so that the start on the building is delayed.

Chapter 15.

THE PANAMA CANAL.

One of the subjects of great interest to me for the past forty years has been the construction of the Isthmian Canal and now that that great work has been done and is in successful operation at Panama, I feel that I have lived in an age of great and lasting events. This event is not like the great war with Germany just closed, but one having a great influence on the future welfare of the world. Considering its magnitude, I believe the Panama Canal one of the most successful engineering works of modern times and that its location and the lock plan adopted and put in operation is right. To have attempted to construct a sea-level canal would have been a mistake of the greatest magnitude and I record this opinion with the full knowledge that some of the most prominent and capable engineers in the world, who were employed in a consulting capacity, recommended the adoption of the sea-level plan in preference to the lock plan, amongst them William H. Burr, William Barclay Parsons of New York, William Henry Hunter, Chief Engineer of the Manchester Ship Canal of England and Eugene Tincauzer, Chief Engineer of the Kiel Canal of Germany. I also believe the work was carried out at last, notwithstanding a bad start, by the best means, under the despotic rule of Colonel George W. Goethals, an honest, capable executive officer of the

Engineering Department of the U. S. Army. In the nature of things, many changes in details were advisable as the work progressed, for instance, the change in the location of the lower locks on the Pacific side, so that any contract that could have been made in advance would have led to great difficulties and extra expense.

In looking back over the history of events leading up to this final consummation, the popular and political difficulties to be overcome were as great as the engineering problems. The original Panama Canal was a French undertaking under Ferdinand De Lesseps and was commenced in 1881. In the year 1884 17,600 men were employed there. In 1889 the original French company failed and the work stopped for awhile, but in 1894, work was started again in a small way by a reorganized French company and so continued until the whole thing was sold to the United States in April, 1904, for forty millions of dollars.

In the meantime an American company had been organized to build a ship canal across the Isthmus of Nicaragua from Graytown on the Atlantic to San Juan del Sur on the Pacific and some preliminary work had been done on it. My friend, J. B. Harris, who, with Mr. Strobridge, had the contract building the railroad from Niles to Oakland in 1869, was at Graytown for a while employed on that work and I talked the whole subject over with him. The whole physical situation there was bad, but the popular backing for that route was strong, largely from the fact that it was an Amer-

ican scheme, while that at Panama was French. However, the starting of work and the report in favor of the Nicaragua route by the Board of Engineers appointed by President McKinley in 1899 on account of its cheaper estimated cost, had its influence on the French owners so they offered to sell and did sell to the United States for forty million dollars, the price at which the Board of Engineers estimated the Panama route more advantageous as to cost. That Board of Engineers consisted of Rear-Admiral John G. Walker of the U. S. Navy (Ret.), Hon. Samuel Pasco, George S. Morrison, Civil Engineer, O. H. Ernst, Lewis M. Haupt, Alfred Noble, Peter C. Haines, William H. Burr and Emory Johnson. The final report of this Commission was in favor of buying out the French interests for forty millions of dollars and adopting the Panama route.

A new treaty was made with Great Britain in 1901 known as the Hay-Paunceforte Treaty, to supersede the Clayton-Bulwer Treaty of 1850. This change allowed the United States to construct an Isthmian Canal open to the commerce of the world on equal terms, so the question was narrowed down to one of "right of way" from Colombia, formerly New Granada, of which the State of Panama formed a part. It was soon apparent that Colombia intended to make the most of the situation without regard to the wishes of the people of Panama who wanted the work to go on, hence followed the rebellion which was undoubtedly aided both by the American buyer and the French seller of the canal property. And furthermore, it seemed like a case where the right of

eminent domain would apply to the taking of property for the general public good of the world without the consent of the owner, on payment by the taker of the actual loss to the party from whom the property was taken. However, there seemed, under the circumstances, but one course to pursue and that was to take what was actually necessary and make an equitable settlement of the damages, if any, in the future. This compensation has just been made by a treaty with Colombia by which she receives compensation in money for the loss of Panama and is herself one of the nations largely benefited by the canal.

The canal was built under authority of an Act of Congress known as the Spooner Act, approved June 28, 1902. President McKinley died on September 6, 1901, and Vice-President Roosevelt became President, but the Cabinet remained the same for awhile. In January, 1904, William H. Taft, who had been Governor of the Philippine Islands, became Secretary of War in place of Elihu Root, who became Secretary of State, and by an order of the President of May 9, 1904, Taft assumed the supervision of the construction of the Panama Canal. At this time there was no definite plan of such a canal except that it was to be from the Atlantic near Colon to the Pacific near Panama.

The first move was the appointment, by President Roosevelt, of a Commission of Engineers to carry on the work. This was February 9, 1904. John G. Walker, U. S. Navy (Ret.), General George W. Davis, U. S. Army (Ret.), William Barclay Parsons and William H.

Burr of New York, Benjamin J. Harrod of New Orleans, C. E. Grunsky of San Francisco, and Frank J. Hecker of Detroit, were appointed. C. E. Grunsky was, at the time of this appointment, City Engineer of San Francisco and the correspondence in regard to the appointment was between President Roosevelt and Mayor James D. Phelan. While it was understood that these appointments were non-political, they were distributed geographically and, as it developed eventually, the Commissioners so appointed were intended to be "dummies" by the appointing power. I had an intimate acquaintance with Mr. Grunsky at the time of his appointment and kept up a correspondence with him after he had reached the Isthmus in April, 1904.

I understood, from reading the Spooner Act, that the appointments of the Chief Engineer and all his subordinates were to be made by this Commission, however on the arrival of Mr. Grunsky in Washington, he found that the Chief Engineer and other principal officers of the Commission had already been selected and they were told to hold a meeting and confirm the officers so appointed. John F. Wallace, who had been construction engineer and, later, manager of the Illinois Central Railroad Company, was the Chief Engineer of the Commission, so elected by the Commission on May 6, 1904. Wallace died July 3, 1921. His appointment was a concession to Congressmen of the Middle West and not for special qualifications.

There was no definite plan and nobody knew what kind of a canal was to be built, whether sea-level or

lock. The French company, at the time of the sale, were working to a plan for a lock canal with a summit level of about 98 feet, the first lock on the Atlantic side to be located at Bohio and the canal to be at sea-level from there to Colon. It was highly probable that this plan would not be carried to completion but the question was, what plan? I believe that to William H. Taft, more than to any one man, belongs the credit for the sifting of the engineering opinions of others and selecting the best. Of course whatever he did, required the sanction of and was promulgated over the name of President Roosevelt, but I believe there was no one in a position to render the service to the country that Taft did at that time, in planning and building the Panama Canal. Under the Wallace management, that continued over a year, work on the Culebra Cut and preparation for deep foundations for locks at Bohio were continued. Soon objection was made to the Bohio location by prominent American engineers. George S. Morrison who had been on a former Commission, strongly urged in public that the location of the dam and locks be moved to Gatun and that a broad earth dam be constructed there instead of a masonry dam requiring deep foundations at Bohio. General Henry L. Abbott and Frederick P. Stearns of Boston also advocated the earth dam at Gatun.

On June 24, 1905, there was appointed by the President, a board of Consulting Engineers as follows: General George W. Davis, Chairman; Alfred Noble, William B. Parsons, William H. Burr, Henry L. Abbott,

Frederick P. Stearns, Joseph Ripley, Isham Randolph, William Henry Hunter of England, Eugene Tincauzer of Germany, Adolph Gurard of France, E. Quilineck of the Suez Canal, J. W. Welcher of Netherlands and Capt. J. G. Oakes, U. S. Army, Secretary. This board was advisory to the management then in power. At the time this board was appointed, Taft forced the resignation of Wallace as Chief Engineer and John F. Stevens was appointed in his place on Taft's recommendation. On April 1, 1905, the original Commission of 1904 had been broken up and Theodore P. Shonts, a New York operator and so-called business man, was appointed president of the Commission and his salary fixed at thirty thousand dollars per year by President Roosevelt. Shonts was not an engineer and, in my opinion, had no reputation to justify such a salary. All this time Taft was Secretary of War, and by virtue of an order of the President of May 9, 1904, was in charge of the entire business and he had to sift the conflicting opinions of those employed in a consulting or other capacity and to make determinations of all main questions and pass the determinations so made up to President Roosevelt. After a careful analysis of the subject, Taft recommended a canal of the lock type with three locks at Gatun and a wide, earth dam there forming an artificial lake, having its surface about 85 feet above sea-level and the order of final determination to this effect was signed by the President on June 29, 1906.

I believe that if the sea-level plan had been chosen, there would have been no canal to this day as the floods of the Chagres River would have filled it up every season and the slides in the Culebra Cut, now troublesome, would have been much worse than they now are. However, every one of the foreign engineers and nearly half of the American engineers voted in favor of the sea-level plan and I believe it was the strong influence of Taft that saved us from an impending blunder. German engineers claimed that the lock canal would fail for lack of water during the dry season, which might have happened had the locks been located at Bohio instead of Gatun as the lake would have been less than one-quarter the size which it now is and the run-off of the Rivers Trinidad and Gatun lost for locking purposes.

In the passage of a large vessel like a battleship, weighing 30,000 tons through the locks from the sea-level up to the 85 foot level of Gatun Lake, a quantity of water somewhat in excess of 30,000 tons is lowered and discharged from the storage lake into the sea and on lowering the vessel again from lake to sea-level, a large quantity of the stored water is also released so that during the dry season, the discharge of the rivers into the storage lake is much less than required for lockage purposes, so a very large quantity of water must be stored up from the rainy season floods to supply this deficiency. And furthermore, this effective storage capacity in the lake is limited to a range of about nine feet of vertical elevation, that is between elevation 88

one foot deep over the overflow weir and elevation 79 below which the depth of water through the cut is too shallow for large vessels to navigate safely. It was necessary, therefore, to make a large artificial lake with a surface range between the above named elevations. The valleys of the Trinidad to the north and the Gatun Rivers to the south, together with the valley of the Chagres River, furnished a large area suitable for this purpose in connection with the earth dam at Gatun, the area of Gatun Lake, as constructed, being about 164 square miles.

There were some slides during construction of the Gatun Dam which were taken advantage of by fault-finders to raise a howl which led to the appointment of more consulting engineers to investigate the situation. Early in 1909, Taft prepared and had published in McClure's magazine for May, 1909, an article in defense of the lock type of canal and the Gatun Dam. Taft had resigned as Secretary of War in July, 1908, to run for the Presidency and he was elected and inaugurated, March 4, 1909. On February 26, 1907, John F. Stevens had resigned as Chief Engineer and Theodore Shonts had also resigned as president of the Commission and the contract planned for doing the work for which bids had been invited was abandoned and a new Commission appointed including three officers of the Engineering Department of the U. S. Army; namely, Major George W. Goethals, Major Gaillard and Major Sibert, General Peter C. Haines, Admiral Eddicott, Colonel W. C. Gorgas, B. M. Harrod, and Jackson Smith.

It was understood at this time that Goethals, the ranking officer of the three army majors named, was to be Chief Engineer and head of the working force and that Colonel Gorgas was to control the Health and Medical Department and that the appointment of a full commission was a formality to comply with terms of the law that the work should be carried out by a Commission. Goethals was soon promoted to Lieutenant-Colonel and the completion of the work of building the canal was carried out under him. Colonel Haines and Harrod soon resigned and the other members of the Commission acted as Goethals' assistants except Colonel Gorgas, who was in control of the Health Department and was supreme within his own department, but he recognized Goethals as head of the whole business on the Isthmus.

Major, now Lieutenant-Colonel D. DuBois Gaillard, who had been in charge of that division of the work, including the big Culebra Cut, since 1909, died in the hospital in Baltimore, in November, 1913, and soon after the name of the Cut was changed to Gaillard Cut.

On the 4th of September, 1907, the first issue of a publication called "The Canal Record" was published and weekly thereafter by the Commission under the direction of Joseph Bucklin Bishop, its Secretary, and that publication was so continued to the completion of the canal thereby keeping the public fully and reliably informed as to the progress of the work.

It was certain from the start that a very large quantity of Portland cement would be required for the concrete masonry for the locks and spillway dam and it

was proposed to manufacture it on the Isthmus from material found there, but Colonel Goethals did not favor doing so if it could be purchased at a reasonable price from reliable manufacturers in the United States. So bids were called for and a contract let to the Atlas Portland Cement Company of North Hampton, Pennsylvania, to furnish four and a half millions of barrels at $1.19 per barrel or in double duck bags at $1.60 per barrel and to credit the purchaser with 8½ cents for each sack returned. The sack cement proved the cheaper as nearly all the sacks were returned. This price was for the cement "delivered over the rail to ship at Hoboken, N. J." delivery to begin on or before October 1, 1909, on 90 days' notice. On September 12, 1912, another contract was let to the same company to furnish a million more barrels of Portland cement at the same price as the contract of 1909. The mixture used in the mass concrete was one of cement to three of sand and six of crushed rock, and in the reinforced concrete for thin walls, one of cement, two and a half of sand and five of crushed rock. The cost of the mass concrete in the Gatun locks as reported by the Accounting Department was $6.59 per cubic yard and in the Pedro Miguel and Miraflores Locks—$4.70 per cubic yard. The cost of the crushed rock in the bins at Gatun was $2.34 per yard while at Pedro Miguel the cost was only 85¢. The sand came from the Pacific side, so that also was cheaper there. So-called "plums" or large rocks placed during construction in the concrete were used in the mass concrete, the volume of these "plums" being

a trifle over 8% of the whole volume, and some theoretical saving was made by their use, but I don't believe, as a matter of fact, there was any saving at all. However, on the whole, the concrete work is a good job, but I think the work at the Pacific end under Division Engineer S. B. Williamson, Civil Engineer, was better and more economically managed than the Atlantic Division.

The most annoying feature of the whole canal construction was the slides that occurred near the finish of the work at the south end of the Cut, known as the Cacuracha Slide.

The cause of these slides was that large masses of hard rock overlaid the soft rock or clay on an inclined bed so that when the side or lateral support was removed by the excavation for the canal, the whole side of the mountain moved toward the canal and continued to do so for months. This work of removing the slide was carried on at a disadvantage and considerable delay was caused in the opening of the canal to commerce. However, that misfortune was small compared to what it would have been had the sea-level plan been chosen.

The first self-propelled vessel to pass through the canal was the crane boat, Alex La Valley. She carried no passengers at the time, only the regular working crew. She was part of the old French working equipment, built in Scotland in 1887, and rebuilt at the Christobal shops in 1905 and had formerly been working at the Atlantic entrance. Her notable voyage past

the Cacuracha Slide, through the Pedro Miguel locks and Miraflores locks to the Pacific entrance of the canal, was January 7, 1914.

On August 15, 1914, the canal was opened to commerce for vessels of less than 30 feet draft. The annoyance of the slides continued for some time and will continue at intervals for years, but will be finally overcome. The canal is now one of the main highways of commerce of the world. The old Panama railroad was destroyed by the canal construction and the new road built on another location. This is the ground I traveled over on the first day of May, 1864, more than 57 years ago, so I have followed this work with special interest.

On the 7th of September, 1915, at the Panama-Pacific International Exposition, at San Francisco, I saw Colonel Goethals plant a tree and heard him deliver an address on the Panama Canal. He said at that time, "I did not design the Panama Canal. The fact is, the design for the canal as finally constructed, was a development in which a large number of people contributed in different degrees." Colonel Goethals is now a Major-General on the retired list of the United States Army.

The moving of the Pacific lock from La Boca where it was started, to Miraflores, was done on Colonel Goethals' recommendation.

The details of this great undertaking were worked out by an able staff of designing engineers, working for moderate salaries with little friction, and the whole work carried out with less graft than any similar work within my knowledge.

William H. Taft is now, July 16, 1921, Chief Justice of the Supreme Court of the United States. He has been a great traveler and his analysis of engineering questions has contributed more to that profession than any one man I know of.

Chapter 16.

PORTLAND CEMENT AND CONCRETE SHIPS.

During the construction of the Panama Canal a large quantity of Portland cement concrete was made and used in various forms and for various purposes, including moulded building blocks for building, and reinforced concrete barges and floats for the working equipment. I did not believe at that time that concrete was a suitable material for the hull of a vessel. It is the ideal material for bridge piers and arches being especially strong in compression, but as to tension and sheer strains is dependent largely on its metal reinforcement. However, I tried to keep track of what was done there in the boat building line and what became of the product, and found they were generally destroyed when a reasonable excuse presented itself by reason of existing circumstances to charge off their cost.

But when the late war with Germany came on and all the commerce of the world on the high seas was being rapidly depleted by submarines and torpedoes any small hope of a new building material for ships to help win the war was accepted and paid for. In this way the government of the United States expended large sums of money on concrete steam ships that is practically a total loss and continued to do so after it was evident to most people that reinforced concrete as a ship building material was much inferior to steel plates and the

propaganda circulated stating that concrete vessels could be built in less time and with less skillful labor than steel vessels was the opposite of the true fact.

When I was on the Isthmus of Panama May first, 1864, bound for California I noticed that the telegraph poles were not made of wood, but found on trying them with my pocket knife that they were made of sand and cement of some kind, but I never knew their composition nor the kind of cement used. However, it shows that the Isthmus was the location of early work in this line as well as the largest use in a single job of any place in the world, as I think the Panama Canal masonry was and is up to the present time.

As early as October, 1910, a man named E. W. Hartman came to Sacramento and announced that he was going to build concrete barges there for the river navigation claiming that he had done that kind of work for the Panama Canal and that the vessels so built were a success, however I don't think actual work on the project was ever commenced. The first real move for the construction of large concrete ships was made by private parties in the construction of the steamer "Faith" at Redwood City, San Mateo County, California. She was launched "broadside" on March 14, 1918. W. Leslie Comyn of the shipping firm of Comyn, Mackall & Company was the active manager and Alan Macdonald of the contracting firm of Macdonald & Kahn, furnished the practical knowledge of concrete work. Mr. E. V. Poss, an engineer familiar with the layout of reinforced concrete work designed the structure of the "Faith."

She was three hundred and thirty-six feet long, forty-four and a half feet beam, thirty feet deep and five thousand tons dead weight. On her trial trip she was reported to have made eleven knots, but her general sea speed was about nine knots. Her lines were as much like a warehouse as a ship. Her first voyages were reported to be fairly successful but each succeeding voyage less so until finally she had to remain for months in the harbor of Buenos Aires unable to obtain any cargo, finally returning to New Orleans without money to pay off her crew. So in the end she was a failure as a business venture however interesting her experiences.

Following the experiments with the "Faith" by private enterprise the United States commenced the building of concrete ships and the builders of the "Faith" acted as contractors, I think on a percentage basis of expenditure. R. J. Wig was the engineer in charge of all government concrete ship building. A new material for the concrete aggregate was obtained from vitrified clay crushed to the required size. The advantage sought over ordinary concrete was lighter weight with the same strength.

A construction yard was established on what was called Government Island near the head of the Estuary of San Antonio at the foot of Dennison Street, Oakland, and the Island was connected to the main land at that place by a pile bridge. On the Island a large amount of money was wasted. Two concrete ships larger than the "Faith" were constructed, the "Palo Alto," being four hundred and thirty-five feet long, fifty-four feet

beam, and of seven thousand five hundred tons. She was an oil tanker. The "Peralta" of about the same size was also constructed there, and much useless work and a large sum of money wasted, largely from incompetence of the officials in charge.

But the fundamental fact was, that a ship could be built of steel plates in less time, at less cost, and the ship so built was a better ship than those made of concrete and the statement that we had reached the limit in quantity of steel plate production was untrue. Several concrete ships were also built about the same time on the Atlantic and Gulf coast, but I don't believe any of them are worth ten cents on the dollar of their cost.

Chapter 17.

GERMAN WAR, PERSONAL OPINIONS.

At the time this work was going on my nephew, Norman Root, of Montreal, was a sub-Lieutenant in the British Volunteer Navy Reserve, having arrived at Liverpool, England, September, 1916, and he was assigned to motor launch service, largely on the coast of Scotland hunting for German submarines. Their patrol extending as far north as the Shetland Islands. The vessels used in that service were small and uncomfortable, frail and dangerous, but he completed the service and arrived at his home in Montreal safely February 25, 1919.

I have preserved a letter from him dated at Peterhead, Scotland, on His Majesty's Motor Launch No. 87, May 6, 1917, in which he says they first had to go to the Naval College at Greenwich a month, then take six weeks on the training ship at Southampton before being put into active work.

I kept as well informed as possible of operations of the war with Germany by private correspondence as well as reading public information carefully. Norman's brother-in-law's business partner Lieutenant-Colonel Buchanan was killed in the trenches in France September 26, 1916, on his 47th birthday.

I have never been in the service of the United States or any other government, yet I feel as if I had taken part in every war during my time.

When the late great war commenced by the declaration of war by Germany against France August 3, 1914, I did the most of my reading at the library of the Mechanics' Institute, 57 Post Street, in San Francisco. I was a life member there. Had been a Trustee of the Institute and felt very much at home there. Several of my engineer friends had offices in that building including Lewis Tashiera, C. E. Grunsky and his two sons, both engineers.

A. L. Voge, who was assistant librarian of the Mechanics' Institute, received a commission as captain in the engineer section of the officers Reserve Corps of the United States Army, dated December 6, 1917, and went to France in the early part of 1918. I helped him in his outfit and received a number of very interesting letters from him. The censorship was strict but Voge gave me many details.

At that time Colonel Brooks of the United States Army was on the retired list. He was a member of the library and a frequenter of the reading room. His father was Rear-Admiral Brooks of the United States Navy. He was familiar with European geography and especially the Mediterranean sea coast. Brooks started in to keep diagrams of the positions of the military forces of the several nations but it soon became so complicated and uncertain he abandoned it. Later he was ordered into active service and left San Francisco.

There is a wide difference of opinion in regard to the question of the United States entry into the war, in

April, 1917, between Germany and France or rather between Austria and Servia which soon enveloped nearly all Europe. This war had been raging since 1914 and the losses of both France and England had been enormous. Both their armies had been badly crippled when the United States declared war against Germany. The immediate cause of the declaration of war was the German government notifying the United States government what they could do and what they could not do on the high seas. Also the death of American citizens on the liner Lusitania sunk on the high seas by German submarines.

President Wilson had tried up to this time to maintain neutrality by the United States. But a fraction of the people of this country led by ex-President Roosevelt urged the entrance of the United States into the war as soon as the German army invaded Belgium in violation of European treaties to which the United States was not a party. However in looking backward my opinion is that the course pursued by President Wilson was for the best interest of the people of the United States. While an earlier entrance into the war by us might have saved to France and England and her colonies some part of their enormous losses this country would probably have lost ten men where we lost one as it was carried out.

And furthermore the British government and people would never have consented to the appointment of a French General as Commander in Chief of all their armies until they were badly crippled and frightened.

This united control of the allied armies was absolutely necessary to their success in the war.

The early conduct of the war by the British under Lord Kitchener had been abominable, especially the campaign against the fortifications of the Dardanelles under the immediate command of General Sir Ian Hamilton and the subsequent withdrawal of the allied forces to the swamps of Salonica. The British and French combined naval attack against the Turkish fortification along the heights of the Dardanelles was badly managed, a large number of ships sunk and men lost and nothing gained. The Turks under German officers with a much inferior force were completely victorious. I believe that had a commander like David G. Farragut been in command of the combined fleet he would have run past the fortification and cut off communication with their source of supply. However the whole campaign there against the protecting fortifications of Constantinople was a total failure and the Australian Colonial troops lost more than two hundred thousand men there.

I kept posted on the geography of that region as it was the same covered by the campaign of the English, French, Turkish, and Sardinian forces in their war against Russia in the Crimean war of 1854. J. C. White who worked for me as architectural draftsman was a boy on one of the British warships at the taking of Sebastopol so I had some idea of the situation there from his stories of that campaign.

By a peculiar turn of fortune Lord Kitchener, a hero in the opinion of a large part of the English people,

was eliminated by his loss on the British cruiser sunk by a German torpedo on his way to Russia; but what reasonable excuse could be given for his going away from the seat of war at that time I never heard and my own belief is he left in a huff at his own ill success and an accident closed his career.

Looking backward at our late war with Germany it seems to me the United States was exceedingly fortunate, getting out of it with much glory with a comparatively small loss of men and resources.

Chapter 18.

MEXICAN BOUNDARY AND LOWER CALIFORNIA.

In the early summer of 1877 I took a trip from San Francisco to Yuma on the invitation of my friend William Hood, later and for many years Chief Engineer of the Southern Pacific Company, to see him start out with his locating party on the line for the Southern Pacific Railroad of Arizona. The end of track had not then reached Yuma, but was a short distance from the Colorado River on the California side. His wife, Josephine, went with him and two other ladies, Mrs. Mitchell Phillips and Miss Corrine Kimball, were of the party and they returned to California with me.

I have quite a vivid recollection of the "Palace Hotel" in Yuma where we put up the day we were there. The floor was of earth, the roof of brush, and the partitions dividing the structure into rooms were made of strips of canvas strung on ropes. The chambermaid was a tall, nearly naked Indian who answered to the name of Jim.

I went out on the plains with Hood to where he found a marker of the boundary of Mexico.

From that time to the present it has always seemed to me that the boundary line between the United States and Mexico, as it was then and is now, at the Colorado River and between upper and lower California, could not endure.

Since that time the great irrigation works and the agricultural properties of the Imperial Valley have come into existence, partly in Mexico and partly in the United States also a railroad has been constructed from the city of San Diego to the Colorado River crossing the national boundary line four times. An American Canal has been constructed across the Isthmus of Panama, so that a large portion of the traffic through that canal passes along the coast of Lower California its entire length, which is of course a Mexican coast for a distance of more than seven hundred and fifty miles. This peninsula of Lower California is separated from the mainland of Mexico by the Gulf of California, much of the way more than a hundred miles wide, and furthermore, Lower California is a territory and not one of the States of Mexico and is very sparsely populated. It contains no railroads except some short mining roads and has no trunk highway or wagon roads. The territory is ruled by a Governor appointed by the central authority at the City of Mexico, with the general purpose of exploiting its resources. Besides there is the possibility of grants being made to foreign colonies especially to the Japanese and thereby disturbing the friendly relations between the United States and Mexico.

Under the existing conditions it has seemed to me for several years past to be the duty of the United States to try to acquire by purchase from Mexico the territory of Lower California and a corner off the State

of Sonora, so as to include the mouth of the Colorado River within the United States.

I understand that the present Constitution of Mexico prohibits any department of the Mexican government alienating any territory. But the same methods by which that constitution was made can be used to change it if change would be of advantage to all concerned and I believe that the present United States Secretary of State Hughes could devise a means of effecting the purchase for a money consideration and helping the government of Mexico to a membership in a league of Nations, whereby Mexico would be protected from being overrun and exploited by foreigners.

This is one of the matters to which I have given considerable attention in the past ten years, but so far without any substantial result. I collected considerable data in regard to the condition and early history of Lower California. I sent to Washington and obtained a copy of the Constitution of Mexico of March, 1917, and furnished Julius Kahn the representative of this district in Congress all the information I could and he was greatly interested in it, but the war with Germany soon coming on displaced everything else for the time being. However I hope to see the arrangement brought about by peaceable negotiation in the near future.

The best source of information I have found on the subject is the book, "A Sketch of the Settlement and Exploration of Lower California," by J. Ross Browne, 1869. I think it is the most comprehensive on that subject in existence at the present time.

If the future development of that country had been anticipated at the time of the so-called Gadsden purchase treaty of December 30, 1853, the present intolerable and unnatural boundary line would have been differently located. By that treaty the United States acquired from Mexico what was known as the Arizonac Country, between the present boundary line and the Gila River, and from the Colorado River eastward to the one hundred and tenth degree of longitude west from Greenwich, with a "pan handle" extending to the Rio Grande near El Paso. The territory so acquired was annexed to the territory of New Mexico which territory was later divided by a north and south line and the territory of Arizona formed out of the western portion thereof.

The original boundary line between the United States and Mexico as established by the treaty of Guadalupe Hidalgo of February 2, 1848, commencing on the Pacific Ocean at a point one marine league south of the southernmost end of the bay of San Diego; thence in a direct line to the Colorado River in latitude 32 degrees and 42 minutes north, thence up the Colorado to the mouth of the Gila River, thence following up the Gila, etc. By the treaty of 1853 the old line between Upper and Lower California was unchanged but, at the Colorado River the new line ran down that river to a point twenty miles south of the mouth of the Gila River and thence southeasterly, being the present recognized boundary, so that the Southern Pacific Railroad of Arizona from the Colorado River eastward to and beyond

Benson is on territory acquired by the United States from Mexico under the treaty of December 30, 1853, and not under the treaty of Guadalupe Hidalgo, at the close of the Mexican war.

However, the mouth of the Colorado River is still in Mexico and the large irrigation canals cross the boundary. Of course the mouth of the river is changing every year and the flood waters rise higher and higher against the levees that protect the valuable agricultural lands of the California side from overflow. So that in a few years the water will overtop the levees and cause great loss, and furthermore, there is under consideration at the present time a project for an immense dam in the Grand Canon of the Colorado River for power and irrigation purposes, and it seems to me the political control of the territory at the mouth of the river is of vital importance at the present time. Perhaps one reason why I feel the importance of it is that I have friends and acquaintances of the engineering profession engaged upon that work as well as upon the railroad work affected by the situation.

Chapter 19.

REVIEW OF MY OWN LIFE AND PERSONAL OPINION ON CURRENT MEDICAL CUSTOMS.

My expenses for medical attendance in the fifty-seven years I have been on my own resources have been small. Before that time, I think it was when I was about nine years old, I had the measles, and think I was made to stay in bed a day or two, but since that time have not stayed in bed a day from sickness.

My most serious time was when I had diphtheria at Sacramento in 1865; however, I did not stay in bed daytimes then. My sister, who was then living in San Francisco, lost a boy five years old from diphtheria and I came to her as soon as I heard of his death, but the funeral had taken place the day I arrived. I stayed in the house where the boy died two days, then went back to Sacramento to Mr. Prentice's house on Ninth Street, southeast corner of the alley between N and O streets, where I was then boarding. In about a week I had headache and sore throat and told Mr. Prentice. He said, "You had better stay around the house today", which I did. Toward noon Doctor Harkness, whom I knew, came along and saw me in the dooryard. He said, "Go into the house; I want to look at your throat", which he did. He said, "You stay at home and take care of yourself; I will send up from the drug store a gargle, a solution of chlorate of potash", which he did, and I used it as